


DRAFT
GENERAL MANAGEMENT PLAN/
ENVIRONMENTAL IMPACT STATEMENT
(VISITOR MANAGEMENT AND RESOURCE PROTECTION PLAN)



ZION
National Park • Utah



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ZION NATIONAL PARK

Washington, Iron, and Kane Counties, Utah

This *Draft General Management Plan / Environmental Impact Statement* describes and analyzes a proposed action and three alternatives for managing and using Zion National Park. The plan is intended to provide a foundation to help park managers guide park programs and set priorities. The alternative that is finally chosen as the plan will guide the management of Zion National Park over the next 15 to 20 years.

The “**no-action**,” or status quo, alternative provides a baseline for comparing the other three alternatives. Under this alternative, park managers will undertake no new construction projects or make any major changes in managing visitor use, except to implement the transportation system in the main canyon.

Three action alternatives would create zones within the park to protect resources and provide opportunities for a range of visitor experiences. All three action alternatives limit park visitation in some backcountry areas, although many of these areas are inaccessible anyway due to their steep topography. In addition, all of the action alternatives call for making adjustments to the park boundary. The **proposed action** would emphasize proactive management to address impacts caused by increased visitor use. Under this alternative, overall park visitation would continue to increase, but it would be limited in certain areas. Some new visitor facilities would be built in frontcountry areas. **Alternative A** would provide greater opportunities for increased use of Zion. Access would be improved inside the park by upgrading or building trails and designating new routes. Additional picnic areas, interpretive facilities, and backcountry campsites also would be provided. **Alternative B** emphasizes the additional protection of park resources while still providing opportunities for a range of visitor experiences. Under alternative B, the number and frequency of shuttles going from Zion Canyon Lodge to the Temple of Sinawava would be reduced, and the lodge would be converted to a research/environmental education center.

A wild and scenic river suitability/eligibility study is included in this document for all of the drainages in the park and several drainages on adjacent lands managed by the Bureau of Land Management. The three action alternatives recommend the inclusion of five drainages and their tributaries in the national wild and scenic rivers system.

This document also discusses the potential consequences of each alternative’s actions on natural resources, visitor use and experiences, and the socioeconomic environment. In general, the three action alternatives would better protect the park’s natural resources than the no-action alternative. Alternative A would provide for greater visitor use than today, but also would have the most negative impacts on natural resources. Alternative B would provide the greatest protection of natural resources, but would have the most negative impacts on visitor use. The proposed action would best protect the park’s natural resources while also maintaining a range of high-quality visitor experiences.

For questions about this document, contact the park planning coordinator, Darla Sidles, Zion National Park, Springdale, UT 84767-1099, or call 435-772-0211. Comments on this document will be accepted through February 11, 2000, at the above address.

HOW THIS DOCUMENT IS ORGANIZED

This document has five main parts. The “Introduction” explains why the plan is necessary and what the plan will accomplish. It provides background information about Zion National Park and describes the park’s purposes, significance, and mission goals. The Introduction also identifies the major issues and concerns of focus of this plan and describes National Park Service (NPS) policies and standard park practices that have guided, and continue to guide, the management of Zion National Park.

The “Alternatives, Including the Proposed Action” part presents alternatives for managing Zion National Park. The no-action alternative describes the present approach to managing Zion without the implementation of a new management plan. The proposed action describes the National Park Service’s preferred approach for managing the park. Alternatives A and B present other options for managing Zion.

The fourth major part is the “Affected Environment.” This part describes selected natural resources of the park and visitor experiences and uses. This part also describes the socioeconomic conditions in the region

surrounding Zion. Information in the “Affected Environment” part provides the context for analyzing the impacts of the management alternatives.

The next part, “Environmental Consequences,” describes the effects each alternative would have on key park resources, visitor experiences and uses, and the socioeconomic environment in the region.

The last part, “Consultation and Coordination,” describes the process the planning team used to involve the public and consult with other agencies during the development of this plan.

The appendixes include a summary of the key legal mandates that affect management and planning for the park, a description of the relationship of the General Management Plan to other planning efforts, detailed definitions of the management zones, a summary of how this plan was developed, and a detailed description of how the drainages in the park and adjacent BLM lands were evaluated for inclusion in the national wild and scenic rivers system.

SUMMARY

The purpose of this conceptual plan is to describe the general path the National Park Service intends to follow in managing Zion National Park over the next 15 to 20 years. The approved plan will provide a framework for proactive decision making on such issues as visitor use, natural and cultural resource management, and park development, which will allow park managers to effectively address future problems and opportunities. In most cases, new development outside of the park would take place to meet visitor needs.

ALTERNATIVES

The planning team developed four alternatives for managing visitor uses and resources in Zion National Park. Each alternative presents a different management approach for directing visitor use and resolving conflicts. The alternatives were based on the park's purposes and significance, the National Park Service mission, other legal mandates and policies, park issues, public views, and information on visitor use patterns and park resources.

The **no-action** alternative provides a baseline for evaluating the changes and impacts of the three action alternatives. Under this alternative, park managers would continue to manage Zion as it has in the past, relying on the 1977 master plan and related existing plans. No new construction or major changes would take place, except for implementing the transportation system in the main canyon. All of the park's existing facilities would continue to be operated and maintained as they have in the past, including the Zion Canyon Lodge. Park managers would continue to limit visitor day use in the Left Fork of North Creek and the Narrows.

The three existing research natural areas would be managed as they have been in the

past. Parunuweap Canyon would continue to be a proposed research natural area and be closed to all recreational use. The riverbank armor and levees along the North Fork of the Virgin River in the main Zion Canyon would be maintained. Most of the park (92%) is proposed for wilderness designation and would continue to be managed under the provisions of the Wilderness Act.

The proposed action is the plan the National Park Service is proposing to implement for Zion National Park over the next 15 to 20 years. Under this alternative, park managers would make several changes to proactively address impacts resulting from increased levels of visitor use. The park would be zoned to ensure that resources were protected and opportunities were provided for a range of quality visitor experiences. Group sizes and visitor numbers would be managed in the backcountry. The Zion Canyon Lodge would continue to operate as it has in the past. This alternative proposes no new major visitor facilities; however, small visitor facilities, such as picnic sites, rest rooms, and short nature trails, could be built in several areas, including Lava Point, the Kolob Canyons, the east entrance, and along the Zion-Mt. Carmel Highway.

Park managers would continue to permit increases in overall park visitation. However, they may place limits on current or future levels of visitor use on nine trails and routes in the proposed wilderness, including part of the Narrows, Middle Fork of Taylor Creek, and La Verkin Creek. The proposed action would not allow recreational use in eight remote backcountry areas due to their designation as research natural areas. Voluntary visitor shuttles may run along the Zion-Mt. Carmel Highway to the east entrance, and Parunuweap Canyon would be open to limited NPS or NPS-sanctioned guided interpretive trips.

Three existing research natural areas (21% of the park) would be deauthorized, while new research natural areas covering 3% of the park would be authorized. Under the proposed action, part of the North Fork of the Virgin River in the main Zion Canyon would be restored to a more natural condition. Most of the park (94%) would continue to be proposed for wilderness designation and would be managed according to the provisions of the Wilderness Act.

Alternative A would provide opportunities for more widespread and increased use of Zion, while still protecting resources and providing opportunities for a range of visitor experiences. Like in the proposed action, park managers would apply management zones throughout the front and backcountry to proactively manage visitor use. The upgrading or building of trails and the designation of new routes would improve access inside the park. Additional visitor facilities, including picnic areas, information facilities, and backcountry campsites, would be provided at Lava Point, the Kolob Canyons area, the east entrance area, and along the Kolob-Terrace Road and Zion-Mt. Carmel Highway.

Park managers would continue to permit increases in overall park visitation, but may need to limit current or future use of two trails and routes in the proposed wilderness — part of the Narrows and Mystery Canyon. Alternative A would not allow recreational use in six remote backcountry areas due to their designation as research natural areas. The Zion Canyon Lodge would continue to operate as it has as in the past. Parunuweap Canyon would be open to limited NPS or NPS-sanctioned guided interpretive trips along the river. New research natural areas, covering about 4% of the park would be authorized, while the three existing research natural areas would be deauthorized. As in the proposed action, under Alternative A, part of the North Fork of the Virgin River in the main Zion Canyon would be restored to a more natural

condition. As in all of the alternatives, most of the park (93%) would be proposed for wilderness designation and would continue to be managed according to the provisions of the Wilderness Act.

Alternative B focuses on providing increased protection for park resources while still providing opportunities for a range of visitor experiences. Like in the proposed action, management zones would be applied throughout the front and backcountry to proactively manage visitor use. A full-service visitor facility would be built near the east entrance, and a mandatory shuttle system would be implemented along the Zion-Mt. Carmel Highway. Alternative B would keep other new development in the park to a minimum. Trailheads would be removed and trailhead parking would be reduced in several areas. Park managers may need to limit current or future levels of visitor on sixteen trails and routes in the proposed wilderness, including Hop Valley, Middle Fork of Taylor Creek, and Orderville Canyon. Alternative B would not allow recreational use in nine remote backcountry areas due to their designation as research natural areas.

Under this alternative, the number and frequency of shuttles going from the Zion Canyon Lodge to the Temple of Sinawava would be reduced to decrease resource impacts and improve the quality of the visitor experience along the Zion Canyon scenic drive and in the Narrows. Visitors also would be required to take a shuttle along the Zion-Mt. Carmel Highway to the east entrance. The Zion Canyon Lodge would be converted into a research /environmental education facility. The National Park Service would authorize nine research natural areas, including Parunuweap Canyon, while deauthorizing the three existing research natural areas. Under Alternative B, part of the North Fork of the Virgin River in the main Zion Canyon would be restored to a more natural condition. As in all of the alternatives, most of the park (95%)

would continue to be proposed for wilderness designation and would be managed according to the provisions of the Wilderness Act.

Boundary Adjustments and Easements

All three action alternatives call for adjusting the park boundary. The National Park Service would propose five Bureau of Land Management (BLM) areas, totaling approximately 950 acres, for transfer to the park. Nine access easements, totaling about 15 miles, and three conservation easements, totaling 2,220 acres, would be proposed on lands outside the park.

Wild and Scenic River Proposals

All three action alternatives propose that five drainages and their tributaries in the park, and six tributaries on BLM lands adjacent to the park, be included in the national wild and scenic rivers system. The five drainages in the park are: the North Fork of the Virgin River above and below the Temple of Sinawava, the East Fork of the Virgin River, North Creek, La Verkin Creek, and Taylor Creek. The drainages partly on BLM lands are: Kolob Creek, Goose Creek, Shunes Creek, Willis Creek, Beartrap Canyon, and the Middle Fork of Taylor Creek.

ENVIRONMENTAL CONSEQUENCES

The planning team evaluated the potential consequences the actions of the alternatives would have on natural resources, visitor use and experiences, and the socioeconomic environment. It was determined that none of the alternatives would appreciably affect cultural resources.

Under the **no-action** alternative, most of the impacts on natural resources would likely be due to the increased use of the park. Moderate to major, long-term impairment of floodplain

functions and processes would continue. The severity of impacts on microbiotic soils would increase, with a moderate to major loss of soils in the most extensively developed and used areas. With existing river channelization measures and high levels of visitor use, Virgin spinedace habitat and the riparian community would also continue to degrade, accompanied by minor to major, long-term, negative effects. There would be a minor to moderate, long-term increase in human exposure to flood hazards along the North Fork of the Virgin River. Even with mitigation measures, minor damage or loss of hanging garden vegetation would likely continue.

The application of use restrictions in specific areas or times of year would prevent adverse impacts on the Mexican spotted owl population. Increased use of the park would likely lead to minor to moderate, negative impacts on desert bighorn sheep foraging areas and air and water quality in localized areas. There would be a moderate reduction in natural quiet from increased visitation and vehicle use in some areas.

Visitors would continue to have unrestricted access to many park resources and the opportunity to choose when they would like to visit these resources. However, the quality and range of visitor experiences within the park would continue to decrease gradually, especially in popular areas in both the frontcountry and backcountry. Crowding and traffic congestion would increase in frontcountry areas (excluding the main Zion Canyon), and opportunities for solitude and quiet would diminish in the backcountry. Overall, these activities would result in a long-term, minor to moderate, negative impact on the visitor experience.

The no-action alternative would have a positive, negligible effect on the local/regional economy.

The **proposed action** would have both positive and negative effects on the park's natural resources. Minor to moderate, localized, adverse impacts on air quality would occur from increased traffic on the park's main roads, although if the use of vehicles were limited on the Kolob Canyons Road, a localized improvement of air quality would result. Minor to moderate, localized, short-term, adverse impacts on water quality would occur from increased use, construction, and river restoration activities. Restoring sections of the North Fork floodplain would have a major, beneficial effect on floodplain functions and values in that reach, and it would enhance spinedace habitat. It also would have a minor to moderate, long-term, beneficial impact on riparian communities. However, there would be a minor, long-term increase in the number of people exposed to flood hazards. Moderate to major impacts on microbiotic soils would occur in localized areas, which would result in a major loss of soils in existing areas of extensive development and use, as well as in newly developed frontcountry areas.

The zoning and use restrictions of the proposed action would also avoid adverse impacts on the Mexican spotted owl population. The potential for minor damage or loss of vegetation in accessible hanging gardens would still exist, however. Disturbance from visitors in sheep foraging areas and from researchers in lambing areas would be negligible to minor; limiting use in Gifford Canyon would have a minor benefit. Under this alternative, there would be a moderate reduction in natural quiet due to increased noise in areas with greater levels of visitation and vehicle use. The reduction in vehicle use on the Kolob Canyons Road would lead to a minor reduction in noise levels. Instituting a voluntary shuttle system on the east side of the park also would lower noise levels.

Under the proposed action, frontcountry experiences would be more structured, and

educational/ recreational opportunities would be enhanced. With the development of new focused visitor facilities, visitors would have greater opportunities to learn about the park's resources. The application of zones in this alternative would help ensure that opportunities for being in solitude and experiencing natural quiet were available in most of the park, and that new opportunities for experiencing other parts of the park, including Parunuweap, were provided. On the other hand, use levels on several trails would be reduced now or in the future, and some visitors may feel that their choices and access were being curtailed in the proposed wilderness area. Overall, there would be a moderate, positive effect on most visitor experiences in Zion's front and backcountry.

The proposed action would likely result in a positive, negligible change in the local/ regional economy. Some individuals and firms may realize moderate to major, positive economic benefits.

Alternative A would result in many of the same positive and negative impacts on natural resources as those described under the proposed action. However, alternative A has a higher potential to impact the resources in certain areas than do the other alternatives. In particular, there would be a greater potential for impacts caused by increased visitor use within a large portion of the desert bighorn sheep range in canyons along the Zion-Mt Carmel Highway. The amount of new development proposed under alternative A also would cause the greatest loss of microbiotic soils associated with developed areas and areas with high visitor use (although from a parkwide perspective the impact would be minor).

Under alternative A, impacts on the visitor experience would be similar to those of the proposed action, except that driving and biking opportunities in the frontcountry and hiking opportunities in the backcountry could

be expanded under alternative A compared to existing opportunities. Opportunities for being in solitude and experiencing natural quiet would still be preserved, and visitors would have additional opportunities to enjoy the park's proposed wilderness, including Parunuweap. However, use levels would be reduced now or in the future on some trails. Overall, alternative A would likely have a moderate, positive impact on most visitor experiences in Zion's frontcountry, and moderate, positive and negative effects on visitor experiences in the backcountry.

The actions in alternative A would likely result in a negligible to minor, positive change in the local/regional economy. Some individuals and firms may realize moderate to major, positive economic benefits.

Under **alternative B**, restoring sections of the North Fork would have the same moderate to major, long-term, beneficial impacts as the other action alternatives. However, this alternative would likely result in many other beneficial effects on the park's natural resources. Decreased visitor use, particularly in portions of Zion Canyon, would generally have minor to moderate, long-term, beneficial effects on a number of natural resources, including spinedace habitat, hanging gardens, air and water quality, microbiotic crusts, riparian communities, and desert bighorn sheep foraging areas. Additionally, this alternative would have no adverse effect on Mexican spotted owl populations. The removal of spring diversion structures within

Zion Canyon and the subsequent restoration of the streams and riparian zones associated with the springs would have a minor, long-term, beneficial effect. Decreased use in portions of Zion Canyon would also result in a minor to moderate decrease in the number of people exposed to flood hazards.

Under alternative B, opportunities for experiencing solitude and natural quiet would be preserved in most of the park, and visitors seeking these experiences would be positively affected by this alternative. Converting the Zion Canyon Lodge to an education/research center would positively affect the experiences of some visitors and school groups. However, fewer visitors would have the opportunity to stay overnight in the park and to ride horses. New use limits would reduce opportunities for visitors who sought to visit the proposed wilderness, although the wilderness experience would be improved. The mandatory Zion-Mt. Carmel shuttle would reduce personal choices in this part of the park. Overall, alternative B would have a moderate to major, negative impact on many visitor experiences in the frontcountry, and moderate, positive and negative impacts on visitors in the backcountry.

The concession business and their employees also would experience moderate to major, negative impacts, although other businesses and individuals would benefit from the actions in the alternative. Overall, the actions in alternative B would result in a negligible to minor, negative change in the local/regional economy.

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PURPOSE OF AND NEED FOR A PLAN

The “Introduction” provides background information about the park and the planning process. This part describes why the National Park Service (NPS) has prepared this *Draft General Management Plan / Environmental Impact Statement* (plan/EIS) for Zion National Park and what the intent of the plan is. It also provides a brief description of Zion National Park; identifies the park’s purposes, significance, and mission goals; identifies the major issues and concerns of focus in this plan; and describes park policies and practices that guide management of Zion.

As one of 378 units in the national park system, Zion National Park is under the management of the National Park Service. The Park Service manages all park units in accordance with the mandate in its Organic Act and other legislation to preserve resources unimpaired for the enjoyment of future generations. To help achieve this mandate, the National Parks and Recreation Act of 1978 and NPS management policies require each national park unit to have a broad-scale general management plan (GMP).

The purpose of this general management plan is to describe the general path the National Park Service intends to follow in managing Zion National Park over the next 15 to 20 years. The plan will not provide specific and detailed answers to every issue or question facing Zion. However, the approved plan will provide a framework for proactive decision-

making on such issues as visitor use, natural and cultural resource management, and park development, which will allow park managers to effectively address future problems and opportunities.

Zion National Park is currently operating under a master plan approved in 1977. In the 22 years since the National Park Service wrote the master plan, many changes have occurred in the park and surrounding area and in park management. In particular, park visitation has grown dramatically, with visitor use levels doubling between 1982 and 1997. This increase in use has affected park resources and the diversity of visitor experiences offered in Zion. The Zion Canyon shuttle system, expected to begin operating in 2000, will also change the visitor experience in the park. A new plan is essential for providing guidance to manage Zion’s visitors in the 21st century, and thus ensure the preservation of park resources and provision of opportunities for visitors to have quality park experiences.

Both the National Parks and Recreation Act and NPS policies require general management plans to address *visitor carrying capacity*. One of the primary purposes of this plan is to achieve this requirement. Carrying capacity is defined under the VERP framework (see box) as the type and level of visitor use a park can accommodate while sustaining resource and social conditions that complement the purposes of the park and its management

The Subtitle of the Zion *Draft General Management Plan*

Like all general management plans, the Zion *General Management Plan* is a conceptual document that establishes a management philosophy and framework for decision making and problem solving in Zion. It is intended to provide guidance over a 15 to 20 year time frame. However, the Zion plan incorporates elements of the National Park Service’s Visitor Experience and Resource Protection (VERP) framework which most past general management plans have not done (NPS 1997a). The VERP framework provides guidance to planners and managers for addressing carrying capacity and assessing visitor use impacts on park resources and visitor experiences. To emphasize the importance of managing visitors and protecting resources, the Zion *General Management Plan* was subtitled a “Visitor Management and Resource Protection Plan.”

objectives. In other words, carrying capacity is a prescription for the levels of visitor use in relation to various natural resource conditions. To set up a framework for addressing carrying capacity, for this document, the planning team divided the entire park into zones, which describe differing desired resource conditions and visitor experiences. (Note that to fully implement the VERP framework, a follow-up implementation plan is needed to identify key social and natural resource indicators to be monitored in each of the park's zones, set standards [minimum acceptable conditions] for each indicator, and develop a monitoring program.)

In addition to the meeting the requirements for addressing visitor use management, park managers needed this new plan to address other issues and concerns that have arisen in the past two decades. These issues include those related to research natural areas (RNAs) (i.e., areas administratively designated by federal land management agencies for research and educational purposes or to maintain biological diversity), noise, and land uses adjacent to the park. (For a complete list of issues addressed in the plan, see "Planning Issues and Concerns.") With most of Zion proposed for wilderness designation, the Park

Service also needs this new plan to address how this designation will affect park management (e.g., changes in park zoning). Finally, a new plan presents an opportunity for park managers to explore and recommend other changes related to managing Zion, such as proposing boundary adjustments and wild and scenic river designations.

This *Draft General Management Plan / Environmental Impact Statement* will have a 60-day public review comment period. During this period, the Park Service also will hold public meetings to provide additional opportunities for the public to provide comments on the draft. After the comment period ends, the planning team will review comments on the draft document, make appropriate revisions, modify various elements of the proposed action and the other alternatives to address comments, and prepare a *Final General Management Plan / Environmental Impact Statement*. The final document will include responses to substantive comments on the draft document. A minimum of 30 days after the final plan is published, the National Park Service will publish a record of decision in the *Federal Register* and the plan will then be implemented.

PLANNING BACKGROUND

BRIEF DESCRIPTION OF THE PARK

Located in Washington, Iron, and Kane Counties in southwestern Utah, Zion National Park encompasses some of the most scenic canyon country in the United States (see the Location map). The park is characterized by high plateaus, a maze of narrow, deep, sandstone canyons, and striking rock towers and mesas. Zion Canyon is the largest and most visited canyon in the park. The North Fork of the Virgin River has carved a spectacular gorge here, with canyon walls in most places rising 2,000 to 3,000 feet above the canyon floor. The southern part of the park is a lower desert area, with colorful mesas bordered by rocky canyons and washes. The northern sections of the park are higher plateaus covered by forests.

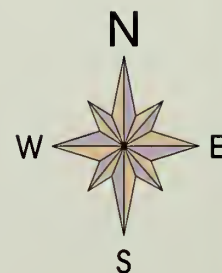
With over 5,000 feet of relief, varied topography, and a myriad of springs and streams, Zion supports a complex and diverse system of plants and animals. About 800 species of native plants have been found in the park — the richest diversity of plants found in Utah. Many species of animals also are present, including 75 species of mammals and about 271 species of birds.

Zion also has a rich human history. The Virgin ancestral puebloan people were the most prominent members of the prehistoric cultures found here, dating back about 2,000 years. The Southern Paiutes also occupied the area and were in residence when the first European Americans reached southern Utah. Evidence of early Mormon settlements, Depression-era/Civilian Conservation Corps construction projects, and other historically significant structures occur throughout the park. Today,

people from around the United States and the world come to Zion to recreate and to learn about and enjoy its many outstanding resources.

Zion is one of the earliest additions to the national park system. On July 31, 1909, President Taft issued a proclamation setting aside 15,200 acres as the Mukuntuweap National Monument. In 1918, another presidential proclamation enlarged the monument to 76,800 acres and changed its name to Zion National Monument. Congress established the area as a national park in 1919. A second Zion National Monument (now called the Kolob Canyons) was established by presidential proclamation in 1937. Congress added the Kolob Canyons to Zion National Park in 1956. The park currently encompasses 148,016 acres. An additional 3,490 acres of private inholdings are present in the Kolob Terrace area, on the west side of the park. (The inholding acreage and all of the other park acreage figures included in this document are based on geographic information system (GIS) calculations. These figures may not correspond with legal description acreages.)

Zion is part of the Southwest's "Grand Circle" of national parks, monuments, historical areas, and recreational areas. Visitors reach the park via Interstate 15, which provides access to the Kolob Canyons area, and Utah Route 9. Zion is 158 miles northeast of Las Vegas and 320 miles southwest of Salt Lake City. The town of Springdale is less than a mile from the park's south entrance. Other nearby towns include Kanab (41 miles from the Zion Canyon Visitor Center), St. George (43 miles), and Cedar City (60 miles).



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DIRECTION FOR THE PLAN — PURPOSES, SIGNIFICANCE, AND MISSION GOALS OF ZION NATIONAL PARK

The purposes, significance, and mission goals of Zion National Park are three of the key elements that shaped the development of the *Draft General Management Plan*. These elements underlie how the park is managed. The *purposes* tell why the park was aside as a unit in the national park system. The *significance* of the park addresses what makes the area unique — why it is important enough to our natural and/or cultural heritage to warrant national park designation and how it differs from other parts of the country. Zion’s *mission goals* articulate the ideal future conditions the National Park Service is striving to attain. All of the alternatives and management prescriptions in this management plan should be and are consistent with and support the park’s purposes, significance, and mission goals.

Based on Zion’s enabling legislation, legislative history, agency management policies, and the knowledge and insights of park staff, the planning team identified the following purposes, significance statements, and mission goals for Zion National Park.

The purposes of Zion National Park are to

- preserve the dynamic natural process of canyon formation as an extraordinary example of canyon erosion
- preserve and protect the scenic beauty and unique geologic features: the labyrinth of remarkable canyons, volcanic phenomena, fossiliferous deposits, brilliantly colored strata, and rare sedimentation
- preserve the archeological features that pertain to the prehistoric races of America and the ancestral Indian tribes

- preserve the entire area intact for the purpose of scientific research and the enjoyment and enlightenment of the public
- provide a variety of opportunities and a range of experiences, from solitude to high use, to assist visitors in learning about and enjoying park resources without degrading those resources

Zion National Park is significant for the following reasons:

- Zion’s stunning scenery features towering, brilliantly colored cliffs and associated vegetation highlighted by a backdrop of contrasting bright, southwestern skies.
- Zion is a geologic showcase with sheer sandstone cliffs among the highest in the world.
- The Virgin River — one of the last mostly free-flowing river systems on the Colorado Plateau — is responsible for the on-going carving of this deeply-incised landscape.
- Because of its unique geographic location and variety of life zones, Zion is home to a large assemblage of plant and animal communities.
- Zion preserves evidence of human occupation from prehistoric to modern times, including American Indian sites, remnants of Mormon homesteading, and engineering and architecture related to park establishment and early tourism.

The mission goals of Zion National Park are to

- provide park visitors educational and recreational opportunities that foster an appreciation of Zion and its resources. Ensure that visitor impacts do not impair resources
- maintain the resources, including plant and animal communities, at healthy and viable levels consistent with natural processes

- manage cultural and physical resources to ensure long-term integrity
- ensure that the built environment provides for safe visitor and staff uses in a sustainable and cost-effective manner
- ensure that the organization is responsive to employee needs, recognizing the contributions of each individual
- foster mutually supportive partnerships with private and public organizations and individuals to achieve visitor use and resource protection goals

PRIMARY PLANNING ISSUES AND CONCERNS

The planning team identified 14 key issues and concerns facing Zion National Park based on discussions with park staff, interested agencies and organizations, and the general public. Many of the issues revolve around the increasing number of visitors, the resulting impacts on park resources, and the quality of the visitor experience. The *Draft General Management Plan / Environmental Impact Statement* provides a framework or strategy for addressing these issues. This section summarizes the key issues and concerns of this document.

This plan will not answer specific questions about the operation of the forthcoming shuttle system in Zion Canyon, such as the number and types of shuttles, frequency of shuttles, shuttle operating times, and locations of most shuttle stops. Decisions regarding these elements were presented in the *Zion Canyon Transportation System Environmental Assessment* (NPS 1997b) and the subsequent "Finding of No Significant Impact."

INCREASING VISITOR USE

Visitation to Zion has grown dramatically over the past two decades. The number of people camping in the backcountry has risen each year, from 7,807 users in 1986, to 19,237 users in 1997. The park's campgrounds are generally full to capacity during the peak months from June through September. Increased visitation is resulting in resource impacts and crowding of some backcountry trails and frontcountry areas.

While most of the park's resources are in good condition, in some areas visitors are inadvertently damaging natural and cultural resources by creating multiple social trails (i.e., unofficial trails formed by visitors). The formation and use of these trails result in

trampled vegetation, eroded soils, stirred up sediments in rivers and streams, and displaced and collected surface artifacts.

Although most visitors rate their experiences in Zion as high, they still express concern about some aspects of the visit. Some visitors feel there is too much vehicular traffic in the park or too much use in general. These visitors suggest limiting the use of the park based on established carrying capacities or other criteria. Another segment of the public wants Zion to continue to be available to all visitors and believes the way to address crowding is not through limits, but by increasing visitor facilities and access, or redistributing visitors to less used areas of the park.

Over 90% of Zion is legislatively proposed for wilderness designation. Under NPS policy, this area must be managed as if it were established wilderness. This obligation carries with it certain expectations for visitors, such as the opportunity to experience solitude and quiet. But these opportunities cannot always be met in some areas of the backcountry due to the behavior and number of other visitors.

The National Park Service must determine the conditions (i.e., resource conditions, visitor experiences) for which Zion National Park should be managed. If park managers allow use levels to increase further, resource damage will increase and opportunities for quality experiences, such as solitude, will decline. If park managers regulate or restrict use levels, resources could be better protected, but visitors would have less freedom to go where and when they choose. If park managers limit use in one area and displace visitors there, other areas within or outside the park could receive higher use levels and resource impacts.

FUTURE OF RESEARCH NATURAL AREAS (RNAS)

Research natural areas are areas administratively designated by federal land management agencies for research and educational purposes and/or to maintain biological diversity. RNAs typically preserve examples of ecological communities that have been little disturbed in the past, and in which current natural processes are allowed to continue with minimal human intervention. Uses in research natural areas are restricted to research that samples but does not alter the existing condition, education, and other activities that do not detract from the areas' research values. Federal land management agencies, including the National Park Service, have established a national network of research natural areas.

Zion National Park currently has three areas designated as research natural areas: Bighorn (8,313 acres), West Rim-Phantom Valley (22,409 acres), and Kolob Mesas (279 acres). Bighorn and West Rim-Phantom Valley were designated as research natural areas in 1942, while Kolob Mesas was designated as a research natural area in 1966. Parunuweap Canyon also has been considered for designation. Park staff raised questions regarding the rationale and need for the three existing park research natural areas, which have not been consistently managed with the intent of the designation and NPS guidelines. Although recreational use is not generally allowed in these areas, most of the currently designated Zion research natural areas are open to recreational use.

Park managers must determine whether Zion National Park should continue to have research natural areas, and if so, how these areas should be managed. If these areas were managed as they were intended under NPS policy, then potential impacts on many of the park's natural and cultural resources would be avoided, but much of the park would be closed to the public. If park managers establish a management designation that permits certain

uses in research natural areas, potential impacts may result, and questions concerning how Zion's research natural areas relate to the national system may arise.

PUBLIC USE OF PARUNUWEAP CANYON

In 1992, park managers closed Parunuweap Canyon for recreational use, pending completion of this planning effort. There are differing opinions on whether or not this area should be opened to the public. Some people want the canyon to be opened for unlimited recreational use, others prefer the canyon to be opened only for strictly regulated recreational use. Still others support keeping the canyon permanently closed to recreational use to prevent impacts on sensitive cultural and natural resources.

Park managers must determine whether or not to open Parunuweap Canyon to the public. If the canyon remains closed, the special resources in this area would be protected, but visitors would not be able to see and enjoy this area. If this area was open the public, the potential for impacts on the canyon's natural and cultural resources would increase. If the canyons were open to limited public use, park managers must answer questions regarding how many people should be allowed into the area, at what times, and at what points. Some people who want to see the area may not be able to do so at the time of their choosing.

FUTURE OF ZION CANYON LODGE

The Zion Canyon Lodge operation has been a traditional use in Zion for more than 80 years. It has enabled many visitors to stay in the park by providing overnight accommodations and food services. Although the lodge is the only place offering these visitor services within the park, other facilities and services are available in Springdale and nearby communities. Some people believe the lodge should continue to

operate, arguing it is a special part of Zion's history, and offers a unique visitor experience and services that add to visitors' enjoyment of the park. Others argue that the lodge is inappropriate and unnecessary in a national park, that it encourages crowding and resource impacts. These people believe the lodge should be closed or converted to another more appropriate use.

The National Park Service must determine whether or not to continue the current operation of the Zion Canyon Lodge. If the lodge remains open as it is now, many people would continue to gain a special experience staying overnight in the park. However, resource impacts also would continue in the area, and the lodge would continue to take away potential customers from businesses in Springdale. If the lodge was closed, some resource impacts would decrease in the area and businesses in Springdale could benefit. However, closing the lodge would eliminate a special visitor experience now offered in the park and adversely affect the lodge employees and the employer.

WILD AND SCENIC RIVER DESIGNATION

Both the public and park staff expressed concerns about maintaining the free-flowing condition and other outstanding values of rivers and streams in and adjacent to Zion. Other citizens are concerned that designating drainages in and adjacent to Zion as wild and scenic rivers would impinge on visitor activities and freedoms. The Wild and Scenic Rivers Act requires park managers to consider potential national wild, scenic, and recreational rivers in planning for water and land resources.

The National Park Service and Bureau of Land Management must determine whether or not to recommend that the drainages in and adjacent to Zion be designated as part of the wild and scenic river system. Making such a

designation would provide additional protection to the park's drainages and could attract additional visitors to the park. On the other hand, if increased use occurs, the designation could result in additional resource impacts in the drainages.

MANAGEMENT OF THE NORTH FORK OF THE VIRGIN RIVER

Recreational use of the North Fork of the Virgin River in Zion Canyon has dramatically increased in recent years. Visitors kayak the river in the spring, and swim and wade in the river during the summer. Concerned citizens have raised questions regarding how the Park Service should manage the North Fork in the future. These questions include:

- What types of recreational uses are appropriate for the river environment and the visitor experience?
- Should the upper portion of the North Fork in Zion Canyon continue to be channelized or should it be restored to more natural conditions?
- If part of the river is restored, what effect will it have on the Zion Lodge, the road, and use of the canyon?

Park managers must determine the appropriate uses for the North Fork of the Virgin River and whether or not to restore the river channel and its floodplain. Limiting certain uses would reduce or eliminate resource and visitor impacts, but this would also reduce the diversity of experiences offered in the park. Restoring part of the river's floodplain would be consistent with the park purpose to preserve the dynamic processes that formed the canyon. River restoration would reestablish a natural morphology and riverine ecology, and maintain or restore habitat for aquatic and floodplain species. The level of restoration would determine the extent of impacts on the park road, footbridges, and

lodge; the level of reduced visitation in Zion Canyon; And The Degree To Which Visitors Faced Safety Hazards when the river does flood.

Although the *Draft General Management Plan / Environmental Impact Statement* focuses on what types of recreational uses are appropriate for the river and whether or not the river floodplain should be restored, this plan will not answer detailed questions about the management of the river. Specifically, this plan will not answer questions regarding appropriate use levels, use management techniques, and the degree of restoration of the floodplain. A future detailed river management plan will address these questions.

DEVELOPMENT AND USES ADJACENT TO THE PARK

The population in the region around Zion National Park has been rapidly growing. As more people move into the area, residential and second-home development has been increasing on lands adjacent to the park. There

most likely will be more development in the future, particularly near the park's south entrance, the Kolob Canyons entrance, and on land near the northeast corner of the park. Private developments and management practices could affect the scenic views from the park, the night sky, ambient sound levels, opportunities for solitude, soil erosion, the composition of native plant and animal communities, and wildlife migration/habitat corridors. They can also restrict or close off visitor and staff access to parts of the park.

Park managers must determine how to manage park resources in light of the development that is occurring, or potentially could occur, adjacent to the park. If no actions were taken, park resources and the visitor experience would most likely degrade in parts of the park. Park personnel could restrict or eliminate current access to some parts of the park or acquire conservation and access easements, which could protect park resources and permanently ensure visitor access.

OTHER ISSUES TO BE ADDRESSED IN FUTURE PLANS

Several other issues are of concern to park managers and visitors at Zion National Park, which are summarized below. The General Management Plan provides some directions and lays the groundwork for addressing these issues. However, future implementation plans will provide specific directions and actions that deal with these issues.

CLIMBING AND CANYONEERING

Climbing and canyoneering are two activities that have dramatically risen in popularity in recent years. These activities have the potential to adversely affect park resources, defacing rock faces, degrading cultural resources, disturbing sensitive species such as peregrine falcons and desert bighorn sheep, trampling vegetation, and forming social trails.

RIVER RECREATION

Concerns have also been expressed about the impacts of river recreation. Visitors kayak the North Fork of the Virgin River in the spring, and swim, wade, and hike portions of the river in the summer. There are concerns about the impacts of these activities on water quality (e.g., increased sedimentation and turbidity, spread of human waste), soil erosion, and sensitive species and the disturbance of other visitors, particularly in the Zion Narrows.

NATURAL SOUNDS, NOISE, AND AIR TOURS

Natural sounds (e.g., water flowing, wind blowing through trees, birds calling) are a resource that contribute to the visitor experience in all parts of the park. Natural sounds predominate in most of Zion; however,

mechanical and other human-created sounds can be a problem in some areas. Noise from aircraft can be heard throughout the park. In the frontcountry (Zion Canyon), some visitors complain that the sounds of automobiles and buses, generators, motorized equipment, and other people at times block out the natural sounds of the park. The intrusion of human-generated noise in the backcountry may negatively affect visitors' experiences. In particular, there is concern that the noise generated by an increase in low-flying aircraft or commercial jets would impair visitors' ability to hear natural sounds and detract from the experience of solitude. Human-generated noise can also affect the behavior of some animals, depending on the type, frequency, and level of noise, especially during sensitive periods such as the breeding season.

Park managers must determine what activities produce, or could produce, unacceptable noise levels in the park. If sources of man-made noise were limited or prohibited, ambient natural sound levels would be maintained, and potentially negative impacts on visitors' experiences would be avoided. But this action also would reduce the range of scenic viewing opportunities.

GUIDE SERVICES

Currently, guided hiking or climbing activities in the park are not permitted. NPS staff-led activities include visitor center and evening programs, and ranger-led hikes. Some visitors and guiding organizations have requested that guided activities be allowed in Zion, believing these operations would enhance many visitors' experience, reduce potential impacts, and help prevent accidents. Other people believe that guided activities should not be permitted, arguing that these operations would increase use in already overcrowded areas and displace

or impact nonguided users. Many questions exist regarding what guided services (e.g., guided hiking, bicycling, climbing) are appropriate in the park. Other questions relate to when and where the services should take place and to what extent.

Park managers will need to determine whether or not to permit guided activities in Zion. Permitting guided services would have both positive and negative impacts, as noted above.

AIR QUALITY

Long-range transport of air pollutants from industrial sources and large urbanized areas, increased numbers of visitors, and increased development in the region as well as near the park boundary have the potential to adversely affect Zion's air quality. Although the park's shuttle system should help to reduce air pollution in Zion Canyon, increased vehicular traffic in Springdale and other parts of the park could increase air pollution. Smoke from campfires in the summer and from residences with wood stoves in the winter is sometimes evident in the canyon in early mornings and evenings. Local trash burns, prescribed burns, and administrative maintenance burns can also produce temporary reductions in air quality.

WATER QUALITY AND QUANTITY

A number of water resource issues exist in Zion, including water rights, water quality, and flood hazards. Impacts on water quality

have occurred in parts of the park due to recreational use and livestock grazing outside of the park. Changes in water quality and water flows could have major effects on park resources and visitors. A parkwide water resources management plan will address these issues and other scientific and legal requirements to promote understanding and management of park waters.

NIGHT SKY

Outdoor lighting in developed areas of the park and in surrounding communities can negatively affect the night sky. As neighboring communities continue to grow, the potential for light pollution affecting the night sky visibility will increase.

CULTURAL RESOURCES

Unmanaged visitor use at archeological or historic period sites can impact the integrity and scientific value of these sites. The nature and extent of these impacts can be difficult to assess, since baseline data on site conditions are often unavailable or incomplete. In recent years, park staff have implemented site monitoring and site condition assessment programs to aid in developing long-term protective strategies for significant sites that could be impacted by visitors. Park managers must maintain historic buildings on an ongoing basis (i.e., cyclic maintenance and rehabilitation) to ensure that conditions are suitable for National Register eligibility.

PARK POLICIES AND PRACTICES

A number of federal laws and NPS policies and practices guide the management of Zion National Park. Appendix B describes some of these key federal laws. This section focuses on park policies and standard park practices that affect the management of Zion. These policies and practices guide the actions taken by park staff on such topics as natural and cultural resource management, use of proposed wilderness areas, development of park facilities, and visitor use management.

These policies and practices would continue to guide park managers under all of the alternatives described in “Alternatives, Including the Proposed Action.” Park staff would continue to implement NPS policies and goals, as identified in *NPS Management Policies* (1988) and the *NPS Strategic Plan* (1997d); several existing formal agreements; and many standard park practices, as described in the “Zion National Park Compendium” (NPS n.d.).

The ongoing management policies and practices of Zion National Park are described below. For each topic discussed, there is a general statement that describes the National Park Service’s desired future condition or goal for Zion. The general strategies or actions taken (or that will be taken) by park staff to achieve the desired conditions are also discussed. Some of the strategies described below are not currently being implemented, but the strategies are consistent with NPS policy, are not believed to be controversial, and would require no additional analysis and documentation under the National Environmental Policy Act.

The alternatives in this plan/EIS include additional desired conditions and strategies besides the ongoing park policies and practices described below. The combination of the ongoing park policies and practices in this part and the strategies specific to the

alternative that is selected for implementation will form the complete *General Management Plan* for Zion National Park.

RELATIONS WITH PRIVATE AND PUBLIC ORGANIZATIONS, ADJACENT LANDOWNERS, AND GOVERNMENTAL AGENCIES

Zion National Park is not an island — the park is part of a greater area, socially, politically, ecologically, and historically. The National Park Service must consider how its actions in Zion affect the surrounding environment and society.

- *Desired Conditions:* The National Park Service manages Zion National Park holistically as part of a greater ecological, social, economic, and cultural system. The Park Service demonstrates leadership in resource stewardship and conservation of ecosystem values within and outside the park. Good relations are maintained with adjacent landowners, surrounding communities, and private and public groups that affect, and are affected by, the park. Zion is managed proactively to resolve external issues and concerns and ensure park values are not compromised.
- *Strategies:* Park staff would continue to establish and foster partnerships with public and private organizations to achieve the purposes and mission of the park. Partnerships would be sought for resource protection, research, education, and visitor enjoyment purposes.

To foster a spirit of cooperation with neighbors and encourage compatible adjacent land uses, park staff would keep landowners, land managers, local governments, and the public informed

about park management activities. Periodic consultations would occur with landowners and communities who were affected by, or potentially affected by park visitors and management actions. Park staff would respond promptly to conflicts that arose over their activities, visitor access, and proposed activities and developments on adjacent lands that could affect Zion. Park managers would seek agreements with landowners to encourage their lands to be managed in a manner compatible with park purposes. Park staff also would seek ways to provide landowners with technical and management assistance to address issues of mutual interest.

The National Park Service would work closely with local, state, federal agencies, and tribal governments whose programs affect, or are affected by, activities in Zion. The Park Service would continue to be an active member of the Southwest Utah Planning Authorities Council (SUPAC). It also would continue to coordinate with the Five County Associations of Governments, and with other local, state, and federal agencies. In particular, park managers would maintain a close working relationship with the Bureau of Land Management, whose land abuts much of the park, to meet mutual management needs. They also would pursue cooperative regional planning whenever possible to integrate the park into issues of regional concern.

GOVERNMENT TO GOVERNMENT RELATIONS BETWEEN AMERICAN INDIAN TRIBES AND ZION NATIONAL PARK

Several Southern Paiute tribes and bands view Zion National Park as part of their traditional homeland. These tribes and bands include the Paiute Indian Tribe of Utah (which includes

the Kanosh, Shivwits, Koosharem, Indian Peaks and Cedar Bands), the Kaibab Band of Paiute Indians, the Moapa Paiute Indian Tribe, and the San Juan Paiute Indian Tribe. The Hopi Tribe and other Puebloan groups also have expressed their close affiliation with Zion.

The National Park Service has developed several park policies based on legal mandates, such as the National Historic Preservation Act, Archaeological Resources Protection Act, Native American Graves Protection and Repatriation Act, and the American Indian Religious Freedom Act. The Park Service has written a formal park policy that exempts Southern Paiute tribal members from paying fees if they enter the park for nonrecreational activities (i.e., traditional religious, ceremonial, medicinal, or other customary activities). The Park Service and tribal governments of the Southern Paiute have also jointly developed a memorandum of understanding that allows, under prescribed conditions, tribal members to gather plants found within the park that are used for traditional and customary purposes.

- *Desired Conditions:* The National Park Service and tribes culturally affiliated with Zion maintain positive, productive, government-to-government relationships. Park managers and staff respect the viewpoints and needs of the tribes, continue to promptly address conflicts that occur, and consider American Indian values in park management and operation.
- *Strategies:* The National Park Service would continue to cooperate with tribes in conducting ethnographic studies to better understand which tribes were culturally affiliated with the park and identify culturally significant resources.

Regular consultations would occur with affiliated tribes to continue to improve

communications and resolve any problems or misunderstandings.

Park managers would continue to encourage the employment of American Indians on park staff to improve communications and working relationships, and encourage cultural diversity in the workplace.

Culturally affiliated tribal values would be considered in efforts to improve overall management and park interpretation.

A joint monitoring program would be implemented to monitor plant-gathering sites for potential impacts, as called for in the memorandum of understanding with the Southern Paiute.

NATURAL RESOURCES (GENERAL)

Protection, study, and management of the park's natural resources and processes is essential for achieving the park's purposes and mission. The "Resource Management Plan" (NPS 1994a) provides details on the strategies and actions to address the park's most important resource management problems and research needs.

- *Overall Desired Conditions:* Zion retains its ecological integrity, including its natural resources and processes. The natural features of the park, including the natural sound environment remain unimpaired. The park continues to be a dynamic, bio-diverse environment. Park visitors and staff recognize and understand the value of the park's natural resources. Park staff uses the best available scientific information and technology to manage the park's natural resources. Park managers ensure that laboratory facilities are available to meet the needs of park staff and independent researchers engaged in fundamental physical, biological, and cultural studies and analyses. Zion is recognized

and valued as an outstanding example of resource stewardship, conservation, education, and public use.

- *General Strategies:* Park staff and other researchers would continue to inventory park resources to quantify, locate, and document biotic and abiotic resources in the park and to assess their status and trends.

Park managers would encourage and support basic and applied research directly through various partnerships and agreements to enhance the understanding of park resources and processes, or to answer specific management questions.

Park staff and other researchers would continue the long-term systematic monitoring of resources and processes to discern natural and anthropogenically induced trends, document changes in species or communities, evaluate the effectiveness of management actions taken to protect and restore resources, and to mitigate impacts on resources.

The National Park Service would continue to expand the data management system, including a geographic information system (GIS), a research data base, and a literature data base, for analyzing, modeling, predicting, and testing trends in resource conditions.

Natural Resource Mitigation Measures

- The National Park Service cannot adequately manage Zion's natural resources without considering the much larger Colorado Plateau/ Mohave/ Great Basin regional ecosystem of which Zion National Park is a part. Thus, park staff would work with other land management agencies whenever possible to manage the

entire set of resources and ecosystems that encompass and affect Zion National Park.

Park staff would apply ecological principles to ensure that natural resources were maintained and not impaired. They would manage fire to maintain and/or restore ecosystem integrity and use integrated pest management procedures when necessary to control nonnative organisms or other pests. Habitats for threatened and endangered species would also be conserved and restored.

Park staff would apply mitigation techniques to minimize the impacts of construction and other activities on park resources (see the text box). Facilities would be built in previously disturbed areas or in carefully selected sites with as small a construction footprint as possible.

Park managers would restore disturbed lands as much as possible and determine on a site-by-site basis whether passive or active restoration was necessary. Park staff would carry out active restoration of previously or newly disturbed areas using native genetic materials to regain maximum habitat value. Should facilities be removed, the disturbed lands would be rehabilitated to restore natural topography and soils, and revegetate the areas with native species. Under some circumstances, primarily in frontcountry developed areas, it may be appropriate and within policy to use nonnative plants in restoration efforts. Additionally, certain exotic plant species may be used to control other, more noxious and invasive exotic plant species. These practices are intended for short-term use only, to achieve a long-term overall goal of native plant community integrity.

Park managers would continue to regularly update the park's resource management plan and prioritize actions needed to protect, manage, and study park resources.

Staff of Zion National Park would continue to apply the following measures to avoid or minimize the impacts on sensitive natural resources:

- enforce trail closures during the Mexican spotted owl breeding/nesting period (March 1 - August 31) for side canyons off of the main Zion Canyon where the owls typically were found
- prohibit the climbing of cliff faces that supported peregrine falcon aeries during breeding and nesting periods (approximately February through July); direct air traffic away from these nesting areas
- limit damage or loss of vegetation and associated species (including Zion snails) in hanging gardens through visitor education and the use of delineated trails, barriers, and signs
- employ erosion control measures or place barriers to control potential impacts on rare plants from trail erosion or social trailing
- employ a variety of techniques, including visitor education programs, restrictions on visitor activities, and ranger patrols, to reduce impacts on wildlife during sensitive times
- use designated river access/crossing points, barriers, and closures to prevent trampling and loss of riparian vegetation
- use interpretive displays and programs, ranger patrols, and regulations on use levels to minimize water pollution.
- close desert bighorn sheep primary lambing areas to public use throughout the lambing and rearing season

AIR QUALITY

Zion National Park is designated a class I area under the Clean Air Act. This designation allows air quality characteristics, including visibility, to be degraded the least, compared to other Clean Air Act designations.

- *Desired Conditions:* Zion's class I air quality is maintained or enhanced with no significant degradation. Nearly unimpaired views of the landscape both within and outside the park are present. Scenic views,

which are integral to the visitor experience and have been identified in the park as per the Clean Air Act, are substantially unimpaired. For example, Mt. Trumbull and the Kaibab Plateau, both over 50 miles away in northern Arizona, can usually be seen from Lava Point. Park staff carry out prescribed fires to replicate ecological conditions and/or reduce dangerous fuel loading, in a manner that minimizes local effects to visibility from smoke production.

- *Strategies:* The National Park Service would continue to work with appropriate state and federal government agencies, industries, nearby communities, land managers, the Southwest Utah Planning Authorities Council (SUPAC), the Utah Division of Air Quality, and the Western Regional Air Partnership to maintain park and regional air quality.

Park staff and other researchers would inventory and monitor air quality in the park to gain baseline data and to measure any significant changes (improvement or deterioration) to Zion's airshed. This would include a complete inventory of in-park emission sources, as well as those in the immediate vicinity of the park.

The Park Service would review, comment on, and recommend actions to minimize or reduce emissions from sources being proposed within 64 miles (100 kilometers) of Zion.

Park managers also would attempt to minimize the effects of in-park pollution sources on air quality. For example, emissions from burning wood in campgrounds and residences may be reduced by establishing nonburn days or by banning wood-burning stoves.

NIGHT SKY

NPS policy recognizes that Zion's night sky is a feature that significantly contributes to the visitor experience. The policy further states that the Park Service will seek to minimize the intrusion of artificial light into the night scene. In natural areas, artificial outdoor lighting will be limited to meeting basic safety requirements and will be shielded when possible.

- *Desired Conditions:* Excellent opportunities to view the night sky are available. Artificial light sources both within and outside the park do not impair night sky viewing opportunities.
- *Strategies:* Park staff would continue to work with local communities to encourage protection of the night sky and would evaluate impacts on the night sky caused by facilities within Zion National Park. To the extent possible, the staff would work within a regional context to protect night sky quality.

If park staff determine that light sources within the park affect views of the night sky, they would study alternatives to existing lighting sources, such as shielding lights, changing lamp types, or eliminating unnecessary sources.

WATER QUANTITY AND QUALITY

Water is a key resource in Zion, shaping the landscape and affecting plants, animals, and visitor use. Nearby communities and landowners also rely on the water that flows into and out of the park. The 1996 Zion National Park Water Rights Settlement Agreement identified state appropriative rights and federal water reserved rights to help ensure that the National Park Service maintains groundwater, stream flows, and spring discharges within the park.

- *Desired Conditions:* The National Park Service fully complies with the Zion National Park Water Rights Settlement Agreement to support park resource, visitor, and administrative uses, and the rights of other water users. Flows in the springs, rivers, and tributaries, including floods, are substantially natural. All water withdrawals and appropriations are limited to authorized amounts in Zion Canyon. Zion's water quality continues to reflect natural conditions and supports administrative and recreational uses, and adjacent communities.
- *Strategies:* With regard to water flows, the National Park Service would work cooperatively with the Utah Department of Natural Resources, Washington County Water Conservancy District, and Kane County Water Conservancy District to implement the Zion National Park Water Rights Settlement Agreement.

Park staff would strive to conserve water in all park operations. Examples of actions that could be taken include replacing irrigation ditches with pipes, reducing irrigated landscapes, and installing low flow fixtures such as toilets and showers.

Park personnel would document and monitor current water consumption in the park and monitor stream flows. The Park managers would review all future projects for compliance with the provisions of the water rights agreement.

Visitor interpretive and education efforts would emphasize the hazards from flash flooding that exist in the park and appropriate responses when flooding occurs. Park staff would educate visitors in techniques to prevent water pollution and safely collect and treat drinking water from natural sources.

Park personnel would develop a program to manage human waste in all areas, particularly in riparian or riverine situations. This program may involve visitors carrying their own wastes out from certain areas.

Park managers also would work with adjacent landowners and the Utah Department of Natural Resources to prevent water pollution and minimize the risk of water-borne diseases stemming from livestock and other sources.

A monitoring program would be established to regularly measure water quality and quantity, including physical, chemical, and biological properties.

NATURAL SOUNDS

NPS Management Policies require park managers to strive to preserve the natural quiet and the natural sounds associated with the physical and biological resources (for example, the sounds of the wind in the trees). The concept of natural quiet was further defined in the *Report on Effects of Aircraft Overflights on the National Park System* (NPS 1995b):

What is *natural quiet*?: Parks and wildernesses offer a variety of unique, pristine sounds not found in most urban or suburban environments. They also offer a complete absence of sounds that *are* found in such environments.

Together, these two conditions provide a very special dimension to a park experience — quiet itself. In the absence of any discernible source of sound (especially manmade), quiet is an important element of the feeling of solitude. Quiet also affords visitors an opportunity to hear faint or very distant sounds, such as animal activity and waterfalls. Such an experience provides an important perspective on the vastness

of the environment in which the visitor is located, often beyond the visual boundaries determined by trees, terrain, and the like. In considering natural quiet as a resource, the ability to clearly hear the delicate and quieter intermittent sounds of nature, the ability to experience interludes of extreme quiet for their own sake, and the opportunity to do so for extended periods of time is what natural quiet is all about.

- *Desired Conditions:* Natural sounds predominate in Zion. Visitors have opportunities throughout most of the park to experience natural sounds in an unimpaired condition. The sounds of civilization are generally confined to developed areas.
- *Strategies:* Park managers would continue to follow several policies and practices to minimize noise both from land and air sources.

Viewing the park from the air is the primary reason for some flights, such as for sightseeing, photography, or filming purposes. The potential exists for increases in air tours and associated impacts in the park. If the Congress enacted aircraft overflight legislation, or if the federal government enacted a national rule, it is highly probable that an interim operating authority would be required to oversee existing park aircraft operations until park managers develop a park air tour management plan. The interim operating authority would consist of a temporary agreement between the park superintendent and the individual air tour operator(s) that would enable air tours to continue as they have in the past. If all parties agree, overflights would be modified to further protect park resources and/or park visitor experiences.

Park managers would work with tour operators and all other interested parties to develop an air tour management plan for

Zion. This plan would determine if commercial air tours would be appropriate for the park, and if so, under what conditions (e.g., the plan may designate specific routes or identify particular areas where such flights would impair park resources or visitor appreciation of the natural sound environment).

The National Park Service would continue to work with the Federal Aviation Administration (FAA), tour operators, commercial businesses, and general aviation interests to encourage aircraft to fly outside of the park, especially for those flights where the presence of the park was incidental to the purpose of the flight (i.e., transit between two points). Actions that may be considered for encouraging pilots to fly outside park boundaries include identifying the park on route maps as a noise-sensitive area, educating pilots about the reasons for keeping a distance from the park, and encouraging pilots to fly in compliance with FAA regulations and advisory guidance, in a manner that minimizes noise and other impacts.

The National Park Service would work with the Department of Defense to develop a process to address the occasional problems that arise from military flights over Zion.

Park managers would follow several strategies to control existing and potential land-based noise sources:

- implement the shuttle system in Zion Canyon and eventually prohibit tour buses, which will reduce noise levels and eliminate the greatest source of noise in Zion Canyon
- continue to require bus tour companies in Zion to comply with regulations that reduce noise levels (e.g., turning off engines when buses are parked)

- encourage visitors to avoid the use of generators, thus reducing related noise (Electric hookups in the Watchman campground should eliminate some of the need for generators.)
- maintain the existing quiet hours in campgrounds
- continue to enforce existing noise policies in the backcountry

Park managers would minimize noise generated by park management activities by strictly regulating administrative functions such as aircraft use and motorized equipment. Noise would be a consideration when procuring and using park equipment. In proposed or designated wilderness areas, the use of motorized equipment would conform to the requirements of the Wilderness Act (NPS Director's Order 41) and related NPS policies. Park managers also would eventually prepare a noise management plan, to provide guidance for managing all noise sources in the park, including buses, generators, NPS equipment, other aircraft, and external sources.

CULTURAL RESOURCES (GENERAL)

Zion's cultural resources, including its pre-historic, historic, and ethnographic resources, are an integral part of the park landscape. Protection of these resources is essential for understanding peoples' past, present, and future relationship with the park environment and expressions of America's cultural heritage. The Zion "Resource Management Plan" (NPS 1994a) provides details on the strategies and actions to address the park's most important cultural resource problems and research needs.

- *Overall Desired Conditions:* Zion's cultural resources are protected and the integrity of the park's cultural resources is preserved unimpaired. Park visitors and employees recognize and understand the

Cultural Resource Mitigation Measures

Park staff would continue to apply the following measures to ensure that impacts on sensitive cultural resources were avoided or minimized:

- consult a Utah state historical preservation officer and undertake an archeological survey, to determine the extent and significance of archeological resources in areas that were not surveyed, for actions that could involve ground disturbance or affect structures and/or landscapes that were either on or eligible for the National Register of Historic Places
- where possible, site projects and facilities in previously disturbed or developed locations
- whenever possible, modify project design features to avoid effects to national register eligible or listed properties
- ensure that archeological monitors were present during all construction activities that could impact subsurface cultural deposits
- add signs and physical barriers to protect sites listed on the national register (or were eligible for listing) from visitor related impacts.
- focus public education initiatives on class I and class II sites, as identified under the park's archeological site disclosure policy

value of the park's cultural resources. Zion is recognized and valued as an example of resource stewardship, conservation, education, and public use.

- *General Strategies:* The National Park Service would support basic and applied research, directly and through various partnerships and agreements, to enhance the understanding of resources and processes or to solve specific management questions.

Park staff would use the best available scientific information and technology for making decisions on and managing the park's cultural resources.

Park staff and researchers would continue to collect information to fill gaps in the

knowledge and understanding of Zion's cultural resources, to assess their status and trends and more effectively protect and manage the resources.

The National Park Service also would continue long-term monitoring of archeological sites to measure the deterioration from natural and human sources and to evaluate the effectiveness of management actions to protect resources and mitigate impacts.

To analyze, model, predict, and test trends in resource conditions, park managers would continue to use and expand a data management system, including a geographic information system (GIS).

To provide the public and park staff with optimum interpretive and resource management opportunities, park personnel would continue to research, document, and

catalogue the museum collection. Museum objects and archival materials would be conserved to NPS and professional standards. The park's museum conservation program would continue to provide for the proper preservation and protection of the museum collection.

Park managers would continue to evaluate park resources to determine if they were eligible for listing in the National Register of Historic Places.

Visitor use management and construction mitigation techniques would continue to ensure that human activities were not impairing park resources. Park managers would rely on a variety of actions to minimize these impacts, including visitor education and interpretation, and use of foot patrols to enforce the Archeological Resources Protection Act. The park's

Zion National Park's Archeological Site Disclosure Policy

The National Park Service has devised and incorporated an archeological site disclosure policy at several national parks in Utah, including Zion National Park. This policy makes information about the location of archeological sites available to the public, but only if "no harm, threat, or destruction of cultural resources will result" from disclosure of that information. In general terms, such information is only provided to those sites that are regularly patrolled, monitored, stabilized, or otherwise protected from visitor impacts or harm. The site disclosure policy establishes three classes of sites, based on the ability of the site to withstand visitor impacts. The following describes those classes and the management actions that continue to be taken with regard to visitor access to sites within each class.

Class I sites are those that are highly visible in the park and generally known to visitors, like the Weeping Rock granary or the south gate petroglyph site. These sites also receive direct physical protection (e.g., fencing, barriers, signs), as well as regular monitoring and condition assessment by park staff and site stewards. Some of these sites may have already been impacted by prior visitor use. The National Park Service provides information on these sites at the visitor center, as well as information on appropriate site etiquette and the Park Service's archeological site protection and use policy.

Class II sites are evaluated as being more fragile and vulnerable to visitor impacts than class I sites, but are also well known to visitors. When visitors request information on a specific site, by name or site number, they are directed to the visitor center and a member of the park interpretive staff. Park personnel provide visitors location information on class II sites only after providing information on appropriate site etiquette and the archeological site protection and use policy. Park staff also regularly monitor class II sites, which have stabilization and protective measures in place.

Class III sites comprise the majority of sites within the park. These are considered to be fragile resources and not appropriate for visitor uses. In accordance with the National Historic Preservation Act and the Archeological Resources Protection Act, location information on these sites is withheld from the general public. The NPS allows access only to those researchers holding valid Archeological Resource Protection Act permits and only after they have consulted with the cultural resource management specialist or the park archeologist.

archeological site disclosure policy would continue to be followed (see the box on the previous page).

Park managers would continue to regularly update the resource management plan and prioritize actions needed to protect park resources.

HISTORIC STRUCTURES

The National Park Service listed a total of 149 historic structures at Zion in the Park Service's 1998 "List of Classified Structures." Seventy of Zion's historic resources are currently listed on the National Register of Historic Places. Modifications of some of these structures due to management and maintenance efforts and/or changes in use of the structures could result in a loss of historic integrity.

- *Desired Conditions:* The historic integrity of the park's historic structures is maintained. Park staff encourage appropriate adaptive uses of the structures, which prolong the life of the structures, whenever possible. Park managers also maintain concession-leased buildings in good condition to retain eligibility for listing on the National Register of Historic Places. New construction is architecturally compatible in terms of design, materials, and scale with surrounding historic structures.
- *Strategies:* In accordance with section 106 of the National Historic Preservation Act, NPS cultural resource staff, the state historic preservation officer, and the Advisory Council on Historic Preservation would continue to review all actions (i.e., preservation maintenance, rehabilitation, etc.) for potential impacts prior to construction.

Park staff would routinely undertake preservation activities on selected park historic structures to maintain the structural stability and integrity of the structures

The National Park Service would rehabilitate historic structures in compliance with the Secretary of the Interior's Standards and Guidelines for Treatment of Historic Properties With Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (NPS 1995a).

Park cultural resource staff would identify and evaluate newly found historic structures and nominate them for listing on the National Register of Historic Places if eligible.

LAND PROTECTION

Private inholdings exist in the Kolob Terrace part of Zion National Park. The National Park Service recognizes that all of these inholdings are private lands and respects the rights of these landowners. Park managers would continue to permit private vehicle access to the inholdings on existing roads, unless the land and associated roads were acquired

The "Zion National Park Land Protection Plan" (NPS 1984) identifies priorities and strategies for acquiring park inholdings. The land protection plan states that "the National Park Service will not seek to acquire any interest in private lands without the consent of the owner as long as these lands are devoted to compatible use."

- *Desired Conditions:* In the short run, landowners manage their lands in a manner compatible with the purposes and mission of the park. In the long run, the National Park Service has agreements or has acquired sufficient interests in the

inholdings to achieve park purposes and mission goals.

- *Strategies:* In the short run, park staff would continue to clearly communicate with landowners regarding desired management of inholdings. Periodic meetings would be held with the landowners to resolve any problems.

In the long run, park staff would continue implementing the actions called for in the land protection plan. Various techniques would be used to protect park values, including cooperative management agreements, acquisition of conservation and access easements, land exchanges, donations, and purchase of fee title.

VISITOR USE AND EXPERIENCE

With the exception of commercial guided activities, visitors have had few restrictions on traditional activities in Zion until the past decade or so. However, over 2.5 million people now annually visit Zion and participate in a wide range of activities. Park managers are taking action to manage this use, minimize or avoid resource impacts, and ensure that visitors continue to have the opportunity for high quality experiences.

- *Desired Conditions:* Zion offers a variety of activities that are consistent with the park's purposes and significance. The vast majority of visitors are satisfied with appropriate park facilities, services, and recreational opportunities. Most visitors understand and appreciate the basic purposes and significance of the park and their stewardship role in preserving park features. They actively contribute to the park's preservation through demonstrated appropriate use and behavior. Visitor use levels and activities are consistent with park purposes and desired resource conditions and visitor opportunities. Re-

source impacts and conflicts between users are minimal. Visitors have opportunities to experience the natural sound environment of the park in an unimpaired condition. They understand and support management actions that are taken to diminish or avoid resource impacts.

- *Strategies:* If it is necessary to take action to address visitor impacts, whenever possible, park managers would use the method that assures the most resource protection. Methods that may be used in this regard include such techniques as providing ongoing visitor education and redesigning or "hardening" facilities (e.g., surfacing a trail or building a fence). More restrictive methods may include implementing a reservation system and requiring permits for certain uses or areas, placing limits on use, and closing areas including trails or campsites. Restrictions on visitor use would be based on a determination by the park superintendent that such measures were consistent with the park's enabling legislation and were necessary to either prevent the degradation of the values and purposes for which the park was established, or to minimize visitor use conflicts.

Park managers would use the transportation system to manage visitor use and distribution within Zion Canyon, according to the need to protect resources and provide quality visitor experiences. Visitor use of specific features or trails would continue to be managed or limited on a case-by-case basis to protect key visitor experiences.

Park staff would periodically conduct visitor surveys to determine visitor satisfaction with the shuttle system and to determine if congestion was occurring in other parts of the park. Park managers would emphasize visitor education,

including pretrip planning regarding the need for and use of the shuttle system.

VISITOR INFORMATION, ORIENTATION, INTERPRETATION, AND ENVIRONMENTAL EDUCATION

The National Park Service uses a variety of methods to orient visitors to Zion, provide information about the park, and interpret the park's resources for visitors. The *Zion National Park Interpretive Plan* (NPS 1996) describes interpretation goals and objectives and interpretive themes. The interpretive plan specifies what park staff will do to provide visitors with information, orientation, and interpretation. The 1996 plan also addresses interpretive media, such as wayside exhibits, bulletin boards, and signs.

- *Desired Conditions:* The National Park Service makes pretrip information available to assist visitors in planning a rewarding visit to the park. Park staff use radio announcements, web sites, mailouts and reservation systems to assist visitors with preplanning. When visitors arrive at Zion, park staff provide information to orient them on what to do (and what not to do), attractions to see, and how to enjoy the park in a safe, low-impact way. Interpretive programs connect the visitor to the park's resources, build a local and national constituency, and gain public support for protecting the park's resources. Outreach programs through schools, organizations, and partnerships build emotional, intellectual, and recreational ties with the park and its cultural and natural heritage.
- *Strategies:* Park managers would continue to implement the park's interpretive plan, with emphasis on providing information, orientation, and interpretive services in the most effective manner possible. Staff

would use state-of-the-art technologies where appropriate.

Park staff would stay informed of changing visitor demographics and desires to better tailor programs to visitor needs and desires. They would develop interpretive media supportive of the park purposes and significant resources.

Working with other federal agencies, the state of Utah, and local communities, park staff would take action to improve pretrip planning and provide enroute information and orientation for park visitors. Park staff would work with local communities and other entities to provide information/orientation and interpretive facilities outside park boundaries where appropriate. Park staff also would seek partnerships with other state and national parks, educational institutions, and other organizations to enrich interpretation and educational opportunities regionally and nationally.

The park evacuation plan and warning system for flash floods would remain in effect. Park staff would continue efforts to educate the public regarding flood hazards and place signage at all new facilities when appropriate to warn of flash flood hazards.

MANAGEMENT OF THE PROPOSED WILDERNESS AREA

In 1974, the National Park Service proposed 120,620 acres in Zion for wilderness designation and identified 12,120 acres of potential wilderness additions. The Park Service prepared an environmental assessment for this proposal, which was submitted to Congress, and has subsequently made minor changes to this proposal to reflect the acquisition of several inholdings and to clarify geographic boundaries. The National Park Service is currently proposing that 135,523 acres of the

park be designated as wilderness; 3,601 acres of private lands within the park boundary remain identified as potential wilderness additions. (These acreage figures are based on computer analyses and may not coincide with previously published figures.) Thus, approximately 91% of the land under federal jurisdiction in Zion is proposed wilderness.

- *Desired Conditions:* All of the lands within the proposed wilderness area retain their wilderness characteristics and values. Visitors continue to find opportunities for solitude and primitive, unconfined recreation. Signs of people remain substantially unnoticeable. The area continues to be affected primarily by the forces of nature.
- *Strategies:* As per NPS policy, park staff would continue to manage the area proposed for wilderness designation as wilderness. Park managers would continue to take appropriate action to limit visitor impacts on resources and maintain wilderness values. (See also “Visitor Use Management.”)

LEVELS AND TYPES OF PARK DEVELOPMENT

A variety of different types of development exist in Zion to transport, house, inform, and serve visitors and park staff. Most visitor and operational developments are concentrated at the south park entrance and in Zion Canyon. Some of these developments are adequate to meet visitor and park needs; other developments, such as some employee housing, do not meet NPS standards.

- *Overall Desired Conditions:* Park development is the minimum necessary to serve visitor needs and provide for the protection of park resources. Visitor and management facilities at Zion and its concessioners meet sustainability

standards, and are harmonious with park resources, compatible with natural processes and surrounding landscapes, aesthetically pleasing, and functional. The Park Service continues to provide access to and use of Zion’s facilities for physically and learning disabled visitors, in conformance with applicable laws, regulations, and NPS policies.

- *General Strategies:* Park staff would properly maintain and upgrade existing development using sustainability principles where necessary to serve the park mission. They would consider and plan for flood hazards and mitigation efforts as appropriate.

Park managers would consider the availability of existing or planned facilities in nearby communities and adjacent lands when deciding whether to construct new developments in the park. This would ensure that any additional development in the park is necessary, appropriate, and cost-effective.

The National Park Service would continue to strive to make affordable housing available within commuting distance of the park (60 minutes), for park staff who are nonemergency response personnel, seasonal employees, lower graded employees, occupants of historic quarters, and concessioner employees.

The National Park Service would modify existing facilities to meet accessibility standards as funding allowed or as facilities were replaced or rehabilitated. Park staff would periodically consult with disabled persons or their representatives to increase awareness of the needs of the disabled and to determine how to make the park more accessible.

Entrance stations would remain on the south and east boundaries of the park

(along the Zion-Mt. Carmel Highway), and at Kolob Canyons. Entrance fees would continue to be collected at these stations.

The National Park Service also would continue to seek opportunities to build the management facilities called for in the 1994 *Development Concept Plan, Zion Canyon Headquarters* and the 1997 *Canyon Transportation System Environmental Assessment* (NPS 1997b). Park managers would work with other governmental, private, and nonprofit organizations to explore locations within and outside the park, and to find partnerships and funding sources to build employee housing and a research facility.

UTILITIES AND COMMUNICATIONS FACILITIES

Basic utilities and related access are necessary within the park to support visitor services and administrative operations and to provide for visitor and employee safety. Occasional maintenance, upgrades, and minor route adjustments are carried out within existing corridors.

Currently, a transmission line right-of-way and a road easement cross the park. The transmission line provides electric power to Rockville, Springdale, and the park's south entrance and main Zion Canyon area. The road easement in effect, between Interstate Highway 15 and the Kolob Canyons visitor center, provides access to a water tank on private lands. This easement includes maintenance of an existing privately owned water line buried in the road corridor.

- *Desired Conditions:* Utility and communications facilities support park operations and public safety with a high degree of reliability, anticipate future loads and needs, minimize impacts on

park resources, and are jointly located with other existing facilities and rights of way to the greatest extent possible. Only those communications facilities necessary to provide for public safety and administrative efficiency are located in the park.

- *Strategies:* New or reconstructed utilities and communications infrastructure will be located in association with existing structures and along roadways or other established corridors in developed areas. This will allow ready access for repair and maintenance, thereby reducing potential visual quality impacts and resource disturbance from overland transport of vehicles and equipment.

When utilities require reconstruction or extension into developed areas not currently serviced, park staff will select routes that will minimize impacts on the park's natural, cultural, and visual resources. Rights-of-way will continue in effect or be established for service lines to existing and planned park facilities (including concessions facilities). Rights-of-way will not be granted for utilities, water conveyance, or other facilities within potential, proposed, or designated wilderness areas except where valid existing rights are established.

Utility lines will be placed underground to the maximum extent possible.

When the existing power transmission line is scheduled for replacement or upgrading, park staff will work with the utility company to analyze and select alternative techniques and routing to minimize potential impacts on the park's natural, cultural, and visual resources. Public involvement through the National Environmental Policy Act process will be solicited.

There is potential for natural gas service to the park, Springdale, and Rockville, routed along State Highway 9. If this possibility materializes, park staff will work with the service company, local communities, and the public to locate the line in a manner that minimizes the effects to park resources. A right-of-way would be established for natural gas distribution lines to NPS facilities within the main Zion Canyon area.

Maintenance of the existing NPS radio system would be continued with solar-powered repeaters at existing sites.

Additional park communications equipment is anticipated for the operation of the Zion Canyon transportation system and providing needed coverage along the Kolob-Terrace Road. These are minimal facilities, which would be located in administrative areas or co-located with existing radio facilities.

Commercial telecommunications applications (Telecommunications Act of 1996) will be processed in accordance with NPS policies (RM-53) and NEPA guidelines. The primary tests for the applications will be whether there is a documented public safety need, whether or not there are feasible alternatives, and whether a facility would result in derogation of the resources, values, and purposes for which the park was established. For NPS and commercial communications needs there will be no facilities located within potential, proposed, or designated wilderness areas (Wilderness Act, 16 USC §1131), except as specifically provided by law or policy.

SUSTAINABILITY

Sustainability can be described in this context as the result achieved by conducting activities

in ways that do not compromise the environment or its capacity to provide for present and future generations. Sustainable practices minimize the short- and long-term environmental impacts of developments and other activities through resource conservation, recycling, waste minimization, and the use of energy efficient and ecologically responsible materials and techniques.

Over the past several years, the federal government has been placing more emphasis on adopting sustainable practices. In particular, Executive Order 12873 mandates federal agency recycling and waste prevention, and Executive Order 12902 mandates energy efficiency and water conservation at federal facilities.

- *Desired Conditions:* All decisions regarding park operations, facilities management, and development in Zion — from the initial concept through design and construction — reflect principles of resource conservation. Thus, all park developments and park operations are sustainable to the maximum degree possible and practical. New developments and existing facilities are located, built, and modified according to the *Guiding Principles of Sustainable Design* (NPS 1993) or other similar guidelines.
- The park has state-of-the-art water systems for conserving water, and energy conservation technologies and renewable energy sources whenever possible.
- Biodegradable, nontoxic, and durable materials are used in the park whenever possible. Park personnel promote the reduction, use, and recycling of materials and avoid as much as possible materials that are nondurable, environmentally detrimental, or that require transportation from great distances.

- *Strategies:* Park staff would work with experts both in and outside the agency to make Zion's facilities and programs sustainable. Park managers would perform value analysis and value engineering, including life cycle analysis, to examine the energy, environmental, and economic implications of proposed park developments. Park staff would support and encourage the service of suppliers, contractors, and concessioners who follow sustainable practices. Park interpretive programs also would address sustainable park and nonpark practices.

ALTERNATIVES,
INCLUDING THE
PROPOSED ACTION



INTRODUCTION

This part describes the National Park Service's proposed approach (the draft proposed action) and three alternative approaches for managing Zion National Park — two action alternatives and one no-action (i.e., baseline) alternative. The alternatives and the assessment of the potential environmental consequences of the alternatives form the core of the *Draft Zion General Management Plan / Environmental Impact Statement*. Alternatives in this plan describe different general visions for the future of the park. They are intended to enable managers, users, neighbors, and the public to consider different approaches to managing visitor use and resources, directing development, and resolving conflicts that may arise at Zion National Park.

This part describes the planning process used by the planning team. It also describes the assumptions made, management zones developed, and range of alternatives generated based on zone-management strategies. This part also describes alternatives, management zones, and actions the team considered but dropped from consideration. The part then describes the four current alternatives — the no-action alternative, which describes existing management in the park; the proposed plan for Zion National Park (the proposed action); and the two other action alternatives. The end of this part contains three tables (tables 5-7) that summarize the key differences between the alternatives and the key differences in the impacts that are presumed will result by implementing each alternative. The impacts table is based on the analysis in the subsequent "Environmental Consequences" part.

THE PLANNING PROCESS

In formulating the alternatives, the planning team considered the park's purposes and significance, the National Park Service

Planning Assumptions

Before the planning team developed the concepts for the alternatives, team members identified several fundamental assumptions that underpin the *Draft General Management Plan*. The planning team considered these assumptions to be "givens" for all of the alternatives and for how the park is managed in the future.

- Existing major developments in the park will remain, although their functions may change. Park staff will continue to maintain the Zion-Mt. Carmel Highway, between the south and east entrances of the park, which will remain opened to through (i.e., nonrecreational commuter) traffic.
- The NPS will not build major new facilities, such as campgrounds, lodges, roads, and full-service visitor centers, within the park, aside from those associated with the transportation system and possibly a visitor center on the park's east side. The planning team assumes that the private sector will provide lodging and camping facilities outside of the park.
- The NPS will continue to implement the Zion Canyon shuttle system, as described in the 1997 *Zion Canyon Transportation System Environmental Assessment*.
- Park managers will adjust staffing levels to reflect the increase in workloads.

mission, and other legal mandates and policies under which the park operates. In addition, the planning team solicited input from the public, government agencies, and other organizations about desired future conditions for the park and specific issues that need to be addressed by each of the alternatives regarding levels of visitor use; water resources; development adjacent to the park, and the like. Team members also gathered information about existing visitor use and the condition of the park's facilities and resources, and they performed resource sensitivity analyses to understand the ability of park resources to withstand visitor use. Finally, the team identified a number of assumptions to guide

development of the alternatives (see box). Appendix E describes in detail how the planning team developed the alternatives. Also, refer to the box with definitions of relevant planning terms.

Using all of the above information, the planning team developed seven potential management zones for guiding the use, development, preservation, and understanding of Zion National Park and its resources. These zones form the basis of the range of reasonable alternatives proposed by the planning team, and are described below. The zones are applied in varying combinations and locations in the three action alternatives. (Note: the zones do not apply to the no-action alternative.)

In October 1997, the planning team presented the initial alternatives and zone management strategies in a workbook for public review. Based on comments from the public as well as park staff, the planning team then greatly revised the initial alternatives, dropped some alternatives and zones from consideration, and identified a proposed action.

Each of the action alternatives identified by the planning team consists of the following elements:

- an overall management concept
- a series of general management strategies and zone-specific management strategies (i.e., zone allocations and actions) that would be implemented
- proposals that require congressional action
- a discussion of priorities and funding necessary for implementing each alternative

Unless otherwise stated, all existing uses and facilities would continue to occur in the park under all of the alternatives.

Definitions of Planning Terms

The following terms are used throughout this document.

Desired conditions refer to the goals or end results park managers are striving to achieve. The NPS can set desired conditions for park resources, visitor experiences, management activities, and facilities. Desired conditions reflect the park's purposes and mission goals, and ensure that the NPS preserves Zion's resources and provides quality experiences.

General management strategies describe the general actions park managers intend to take to achieve the desired conditions. These strategies are not tied to management zones. They may apply parkwide (e.g., general visitor use management) or to specific geographic areas or facilities (e.g., Zion Canyon Lodge).

Management zones identify how different areas in the park will be managed to achieve a combination of desired conditions. Each zone prescribes a unique combination of physical, biological, social, and managerial conditions.

Zone-specific management strategies describe the actions that would, or could, be taken to achieve the desired resource conditions and visitor experiences for a given zone.

As noted in "Park Policies and Practices," the National Park Service would continue to follow a number of strategies in Zion regardless of the alternatives considered in this plan. These strategies are not repeated in this part. However, there are *other* general management strategies that *do* differ among the alternatives. These alternative management strategies are organized in this part by topic area.

Several other points are important to keep in mind while reading the management alternatives. The alternatives are conceptual in nature, focusing on *what* resource conditions and visitor experiences should be in Zion rather than on details of *how* they should be achieved. Thus, the alternatives do not contain details on facility designs and locations or describe specific visitor use management techniques. The Park Service will require additional feasibility studies, more detailed

planning, and appropriate environmental documentation before it can build any developments proposed in the alternatives. The implementation of any alternative also depends on future funding — this plan in no way guarantees that the money will be forthcoming. The *Draft General Management Plan* establishes a vision of the future that will guide year-to-year management of Zion National Park, but full implementation of the plan could be many years in the future.

The three action alternatives propose actions that may be taken as a result of zoning requirements and restrictions. These possible actions are identified for specific areas of the park. Some of the actions are required to meet the desired zone conditions. Other actions are intended to improve visitor experiences and/or resource conditions in areas that presently satisfy zone conditions at some minimal level. The actions described are those the planning team believed to be the most likely to take place over the next 20 years in the park given the zone definitions, what already exists in an area, and the area's environmental constraints.

Finally, another important point to keep in mind is that Zion is in an area where geologic forces are continuing to shape the landscape. It is not possible to plan for these changes during the life of the plan. However, if a major disaster occurs, such as a landslide or fire, the National Park Service will reconsider its goals for the affected area, including zone prescriptions, uses, and infrastructure, and amend the plan accordingly.

SUMMARY OF THE MANAGEMENT ZONES

The key elements of the zones are summarized below. (Appendix D describes additional details on the zones.) It is important to note that several of the zones place limits on the number of people allowed in Zion's backcountry — managing group sizes and

encounters with other groups will affect how many people can go into different areas in the park. The group sizes in the zones roughly correspond with existing use patterns.

Under the proposed action (and the other action alternatives), Zion would be divided into different zones. These zones identify how the different areas of the park would be managed to achieve desired resource and social conditions and to serve recreational needs. The zones are intended to protect park resources and make a range of quality activities available for visitors. The zones give visitors an understanding of where certain activities are and are not allowed. They also tell park managers where development can and cannot be added and the intensity of management that is appropriate in different parts of the park. Note that the no-action alternative would not follow a new zone-management strategy.

Frontcountry High Development Zone.

This zone would provide visitors with highly structured opportunities to enjoy and learn about the park by means of motorized, primary roads. In essence, visitors would feel that they were in a pocket of civilization surrounded by the park's natural beauty.

- ◆ Both natural processes and the natural landscape would be highly modified.
- ◆ A wide array of visitor services and facilities would be available, including primary motorized roads, visitor centers, and developed campgrounds.
- ◆ Visitors would experience highly social conditions, although there would be some opportunities at certain times for solitude.
- ◆ Limits would only be placed on the numbers of people to address resource protection concerns or facility design capacities.

Frontcountry Low Development Zone.

Visitors would have a fairly structured, rural experience oriented around motorized sightseeing on secondary roads, camping, picnicking, and taking short walks.

- ◆ Natural conditions would be unmodified in most of the zone.
- ◆ Basic facilities and services would be provided, but they would be fewer and less concentrated than in the frontcountry high development zone. Focused visitor facilities, secondary roads, picnic areas, and less developed campgrounds are examples of facilities that may be present.
- ◆ There may be opportunities to camp in campgrounds.
- ◆ There would be few opportunities for solitude, but the social environment would remain uncrowded.
- ◆ Limits would only be placed on the numbers of people to address resource protection concerns or facility design capacities.

Transition Zone. The main purpose of this zone would be to allow visitors to view or directly access many of the park's prime resources by means of nonmotorized, well-developed, high use trails.

- ◆ Natural processes and landscapes may be altered or manipulated in developed areas, but most of the landscape would be largely undisturbed and the resources protected.
- ◆ Only minimal facilities (e.g., trails, a few designated campsites) would be present. Park managers would concentrate visitor use within or near these facilities.

Definitions of Visitor Facilities

The following types of facilities are present in the development zones.

Full-service visitor centers provide a variety of services including: restrooms, orientation, interpretation (e.g., introduction to the park, themes, all manner of interpretive media), trip planning, item sales (interpretive and informational), and fee collection (e.g., as part of trip planning). Park staff would also issue permits at these centers, but would not provide food service. Full-service visitor centers would only be allowed the frontcountry high development zones.

Focused visitor facilities focus on only a few functions. Unlike a full-service visitor center, these facilities provide interpretation related to resources at-hand, and limited, if any, sale items. Restrooms may be present. Focused visitor facilities may be indoor or outdoor, and be staffed or unstaffed, depending on need and the services provided. They may be found in both frontcountry low development and frontcountry high development zones.

Picnic sites have tables and could include grills, trash facilities, and restrooms. Water would be provided only if it was already present. In the frontcountry high development zone, many picnic sites could be added to a given area, but in the frontcountry low development zone, the number added could only total a cumulative of 10 sites per area, such as at Lava Point. Picnic sites may be located in frontcountry high development, frontcountry low development, and transition zones.

- ◆ This zone would be primarily for day use, but limited overnight camping at designated sites may be allowed.
- ◆ During the peak season, there would be a low expectation of solitude due to the sights and sounds of other people. However, crowded levels would not keep visitors from reaching desired destinations or viewing outstanding park features.
- ◆ Limits would only be placed on day use to address resource protection concerns or facility design capacities. Overnight use could occur only in a few designated walk-in campsites.

Overnight group sizes would be limited to eight individuals (in horse parties, the total number of people and horses combined could not exceed eight).

Primitive Zone. This zone would provide better opportunities for visitors to experience wildlands and solitude than the zones described above. However, compared to the pristine zone, access would be easier into this zone, there would be signs of people, and the area would feel less remote.

- ◆ The landscape would be largely undisturbed, with natural processes predominating.
- ◆ There would be very little development. Only narrow, unpaved trails and/or routes would be maintained. Other facilities related to protecting resources may be provided.
- ◆ Primitive camping may be permitted at large or in designated campsites, but camping facilities would not be provided.
- ◆ There would be a sense of being in a natural landscape with a moderate sense of solitude.
- ◆ Park personnel would manage the number of people in this zone. Group sizes for day and overnight use would be limited to eight or fewer individuals (in horse parties, the total number of people and horses combined would not exceed eight). No more than 12 groups generally would be encountered per day in the zone.

Pristine Zone. The pristine zone would offer the feeling of being entirely alone in Zion's remote and isolated wildlands. Visitors would have a chance to experience a pristine natural landscape, free of all signs of people, except for faint

Establishment of Carrying Capacities

A visitor experience and resource protection plan (VERP; see "Visitor Use Strategies") is expected to be completed following the approval of the *General Management Plan*. Establishment of visitor experience and resource condition standards and indicators will be the basis for determining a visitor carrying capacity for each of the zones in the park. These standards and indicators should help safeguard the quality of Zion's resources and visitor experiences.

routes. No horse groups would be permitted in this zone.

- ◆ Natural conditions and processes would be largely undisturbed by people. The only sign that others have used the area may be faint hiking routes or bolts on climbing routes. Culturally significant resources also may be maintained.
- ◆ No visitor facilities would be provided.
- ◆ Visitors could camp throughout the zone, although in some cases, camping sites would be designated to protect resources.
- ◆ Opportunities for a high degree of solitude would be provided throughout the zone.
- ◆ Use of these areas would be very limited. Groups would be limited to no more than five people. Visitors would usually not expect to encounter other groups in the zone.

Research Natural Area Zone. A research natural area (RNA) is an administrative designation that federal land management agencies use to set aside field ecological areas primarily for research and educational purposes and/or to maintain biological diversity. This zone applies the key conditions of research natural areas. Conducting baseline inventories and long-term ecological observations would be

emphasized in this zone, with the primary purpose to create an ecological/environmental benchmark over time. This zone would not be opened to recreational uses, but may be opened to educational uses.

- ◆ Research natural areas would be areas with little to no human disturbance.
- ◆ No visitor facilities would be present. Trails and temporary research equipment may be permitted in limited instances.
- ◆ In general, camping would not be permitted, unless it was essential for meeting research goals and was consistent with other park policies.
- ◆ Group sizes for research, educational, and administrative activities would be limited to eight or fewer individuals.

Administration Zone. The primary purpose of this zone would be to support the management and administration of the park. General visitation would not occur, although some visitors may need to access these facilities/areas to obtain staff assistance or to solve a problem.

- ◆ Natural processes and landscapes would be altered to support park operations.
- ◆ The type and level of development and concentration would vary as needed to provide for park operations.
- ◆ NPS staff, concession employee, and researchers may be provided with housing, but visitor camping would not be permitted.
- ◆ Park staff would not encourage public visitation, although there would be no limits placed on the use of this zone.

ALTERNATIVES, ZONES, AND ACTIONS CONSIDERED BUT NOT ANALYZED FURTHER

The five alternatives initially presented in the October 1997 workbook formed the foundation for the alternatives included in this plan/EIS. Based on public input and further analysis of the five initial alternatives, the planning team revised these alternatives. The team dropped three of the original alternatives from consideration, although they incorporated key elements of these alternatives into the remaining alternatives. In addition, the team dropped two potential management zones — semiprimitive and resource reserve management areas. Appendix E explains the rationale for why the alternatives and management zones were dropped.

The planning team considered several actions during the planning process, but subsequently eliminated them from further analysis. These actions and the rationale for no longer considering them are described below.

Opening Parunuweap Canyon to Public Use

In several of the draft alternatives presented in the October 1997 alternatives workbook, the planning team zoned part or all of Parunuweap Canyon for pristine or primitive use. These zones would allow for limited, but independent, travel through the area by the public. The team determined, however, that such use would have too great a potential for disturbing or harming the highly sensitive resources within Parunuweap Canyon. Therefore, while Parunuweap would still be opened to public use under two of the action alternatives, park managers would permit visitation only for NPS or NPS-sanctioned interpretive guided trips.

Adding Frontcountry Camping Facilities

Although considered in some of the draft alternatives in the October 1997 alternatives workbook, the planning team decided not to add new camping facilities in Zion's frontcountry (with the exception of slightly expanding the Lava Point campground). The team believes that the private sector outside the park should and can provide these facilities. This belief is supported both by *NPS Management Policies* (1988, 9:12), as well as by the fact that private interests are already developing new campgrounds on lands north of the Kolob entrance and outside the east entrance of the park.

Terminating the Zion Canyon Shuttle System at the Zion Canyon Lodge

One of the actions the planning team considered was terminating the Zion Canyon shuttles at the lodge. This action would mean motorized use north of the lodge would be prohibited, which would dramatically reduce visitor use levels at the Temple of Sinawava and the Narrows, reduce resource impacts, and provide the opportunity for high-quality experiences for those able to hike or bicycle up the canyon. The planning team dropped this action because it would prevent a large majority of people from enjoying one of the park's primary attractions.

NO-ACTION ALTERNATIVE

This alternative provides a baseline for evaluating the changes and impacts of the other action alternatives. Under this alternative, the Park Service would continue to manage Zion as it has in the past, relying on existing plans. All existing visitor facilities would remain in place. The main Zion Canyon, Kolob Canyons, and the Zion-Mt. Carmel Highway would continue to be the primary visitor attraction areas (see the No-Action Alternative map). No new construction would be authorized and no major changes would be made in managing the park, with the exception of implementing the transportation system in the main canyon.

GENERAL MANAGEMENT STRATEGIES

In the no-action alternative, park staff would continue to follow all of the desired conditions and strategies described earlier in "Park Policies and Practices." For example, the desired conditions and strategies for the Zion Canyon Lodge and the North Fork of the Virgin River in the no-action alternative reflect how park managers are currently managing the lodge and the river.

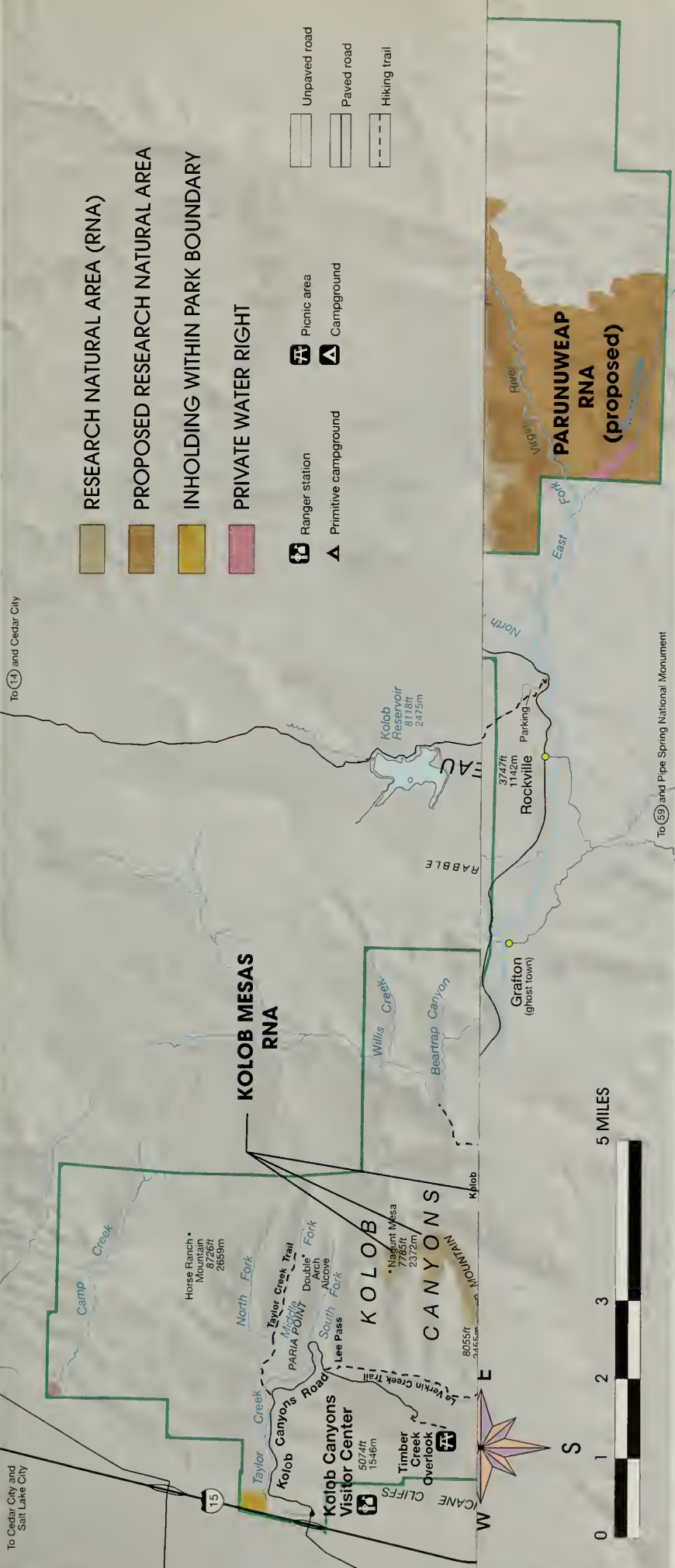
Under the no-action alternative, park managers would also implement additional strategies for managing visitor use that were not listed in "Park Policies and Practices." Many of the desired conditions and strategies described below are already being carried out. Others have not yet been implemented, but funding for them is imminent, or they have been covered in other existing plans and documents that have undergone appropriate environmental compliance.

Visitor Use Management Strategies

The park would follow all of the policies and practices for managing visitor use that were identified in the "Park Policies and Practices" chapter. Commercially guided activities in the park would continue to be prohibited, although short guided hikes in the main canyon would continue to be provided and visitor center and campground programs would still be offered.

Aside from the existing visitor use management policies listed below, park managers would likely place few additional limits on visitor use. Thus, visitation could continue to increase throughout most of the park. Park staff would continue to enforce the following existing use management policies:

- Groups in the backcountry would not exceed 12 people in the same drainage, route, or trail on the same day.
- The Left Fork of North Creek would continue to be a day use only area. Park managers would continue to require a permit for all users, and there would be a limit of 50 people per day who can hike in the drainage.
- Visitors would still need to obtain permits to day hike from the top of the Zion Narrows (Chamberlain's Ranch) to the Temple of Sinawava; a maximum of 80 people per day would be allowed to undertake this hike.
- Visitors would continue to need a permit to overnight hike through the Zion Narrows. The policy to allow only one-night stays would continue. Overnight hikers must start from Chamberlain's Ranch and camp at designated campsites. A maximum of twelve parties (70 people) would be permitted to camp in the Narrows at any one time.



The National Park Service recognizes that inholdings are private lands and it respects the rights of the landowners. Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

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- A total of 23 parties would be permitted to camp overnight at designated sites along La Verkin Creek/Hop Valley.
- A total of nine parties would be permitted to camp overnight at designated sites along the West Rim trail.
- A maximum of six horses and/or pack animals would continue to be permitted in any single party traveling in the park. Horses and pack animals would not be allowed to spend more than one night in any location on a backcountry trip, and would continue to be confined to established trails in the proposed wilderness area. Several areas would continue to be closed to horses and pack animals due to trail conditions and safety and resource concerns.

Desired Conditions and Strategies for Zion Canyon Lodge

The lodge operation has been a traditional use in Zion for more than 80 years. It has enabled many visitors to stay in the canyon by providing overnight accommodations and food services. Although the lodge is the only place offering visitor services inside the park, other facilities and services are available in Springdale and nearby communities.

- *Desired Conditions:* The Zion Lodge offers a unique historical visitor experience that adds to visitor enjoyment and is distinct from the experience provided in surrounding communities. The lodge continues to provide food services, a gift shop, and overnight accommodations. The lodge operation remains at a sustainable level, within the land assigned to the concessioner in their 1998 contract.

- *Strategies:* During periods of contract renewal or renegotiations, the National Park Service would continue to include provisions to ensure that the lodge maintained the qualities of a “historic district” and provided opportunities for visitors to enjoy this historic resource. A subsequent commercial services plan for the park would describe these qualities more fully. The Park Service would retain the characteristics of the lodge as a “historic district,” listed on the National Register of Historic Places, and would consider these characteristics in planning, managing, maintaining and interpreting the entire complex.

Desired Conditions and Strategies for Management of the North Fork of the Virgin River

The North Fork of the Virgin River is one of the park’s major visitor attractions. Thousands of visitors come to the river to cool off, swim, wade, hike, and backpack, among other recreational activities. The river also has outstanding geologic value and provides important habitat for four native fish species, including the Virgin spinedace, and other aquatic organisms. Its riparian area also supports diverse wildlife and plant populations.

- *Desired Conditions:* The North Fork continues to provide high quality experiences for visitors. Visitor use levels and activities are consistent with park purposes — visitors enjoy the river without impairing resources. Conflicts between users are minimal. The river’s water quality and natural biological community are improved or maintained and protected. No additional human-caused changes occur to the river’s floodplain.

- *Strategies:* Park managers would continue to enforce existing visitor use limits for through day hikes and over-night camping in the Narrows. Interpretive displays and programs and ranger patrols would still be used to help minimize resource impacts and user conflicts. Under this alternative, no actions would be taken to restore the North Fork of the Virgin River. The existing riverbank armor and levees would remain.

GENERAL PARK MANAGEMENT

Under the no-action alternative, park managers would continue to manage three broad land use categories (not including the private inholdings within the park boundary): developed areas (or frontcountry), proposed wilderness, and natural areas. Developed areas cover about 740 acres and include lands with aggregations of visitor facilities and administrative facilities. The following facilities are in developed areas of the park:

- Kolob Canyons Road
- Timber Creek Overlook picnic area and parking area
- Lava Point (including the campground, picnic area, ranger residence/visitor contact building, and trailhead)
- South entrance
- South and Watchman campgrounds
- Old visitor center/headquarters
- New visitor center/transportation staging area
- Oak Creek residential and maintenance area
- Watchman and Pine Creek (superintendent) residential areas

- Birch Creek concession area and the water and storage facility
- Zion Canyon Lodge and related facilities
- Grotto picnic area
- Weeping Rock parking lot
- Temple of Sinawava parking lot and rest rooms
- Zion-Mt. Carmel Highway
- Tunnel parking lot and trailhead
- East entrance

As called for in the development concept plan for the Zion Canyon headquarters area (NPS 1994b), the National Park Service would build research facilities in the south entrance-main Zion Canyon area in association with existing and other planned facilities. The research facilities, consisting of a small laboratory and housing, would support resource monitoring and studies conducted by park staff and cooperators.

Most of the park (135,523 acres) is within the wilderness land use category. The remainder of the park that did not fit in the developed areas or proposed wilderness categories would be managed as natural areas. The management of the natural areas would provide for environmentally compatible recreational activities based upon and protective of the natural environment. Park roads, dispersed recreational facilities, such as picnic areas, and interpretive facilities, may be present in these areas.

Proposed Wilderness

In 1974, the National Park Service completed an environmental impact statement that proposed that Congress designate most of Zion National Park as wilderness (NPS 1974). Since the original 1974 wilderness proposal was drafted, minor

changes have been made to the proposal. Under this no-action alternative, the planning team would modify the 1974 wilderness proposal to reflect acquisitions of several inholdings and make the wilderness boundaries easier to identify on the ground (see the Wilderness — No-Action map). Congress has not acted on whether or not to accept this proposal.

The National Park Service would continue to manage the proposed wilderness area in a manner consistent with the 1964 Wilderness Act and with NPS policies. Zion visitors would continue to go camping, hiking, climbing, and canyoneering on established trails as well as cross-country (off-trail). Existing trails, routes, designated campsites, and other wilderness structures would be maintained and the use of horse and pack animals would generally be confined to established trails in the proposed wilderness. The following areas would continue to be closed to horses and pack animals: the Kolob Arch trail, Beartrap Canyon, Willis Creek, the East Mesa trail below its junction with the Observation Point trail, the west rim trail below the west rim, and the Taylor Creek trail. Park policy would continue to permit off-trail use of horses and pack animals in Coalpits Wash, Huber Wash, Scoggins Wash, and the Crater Hill area.

Under the no-action alternative Parunuweap Canyon would still be closed to public use.

Research Natural Areas

Zion currently has three designated research natural areas: Bighorn (8,313 acres), Phantom Valley (22,409 acres) and the Kolob Mesas (279 acres) (see the No-Action map). These areas are also in the proposed wilderness. Under the no-action alternative, park managers would continue to manage the three research natural areas as they have

been in the past and continue to permit recreational users into these areas.

PROPOSED BOUNDARY ADJUSTMENTS AND EASEMENTS

The planning team would propose no adjustments to Zion's boundary in this alternative, nor would the team seek any no-access or conservation easements.

PROPOSALS FOR WILD AND SCENIC RIVER DESIGNATION

At the same time the planning team was developing this plan, a wild and scenic river suitability/ eligibility study was being prepared. However, for purposes of comparing and analyzing the impacts of the alternatives in this environmental impact statement, under the no-action alternative-no-proposals would be submitted to Congress to designate any of the rivers and streams within or adjacent to Zion as wild and scenic rivers.

IMPLEMENTATION

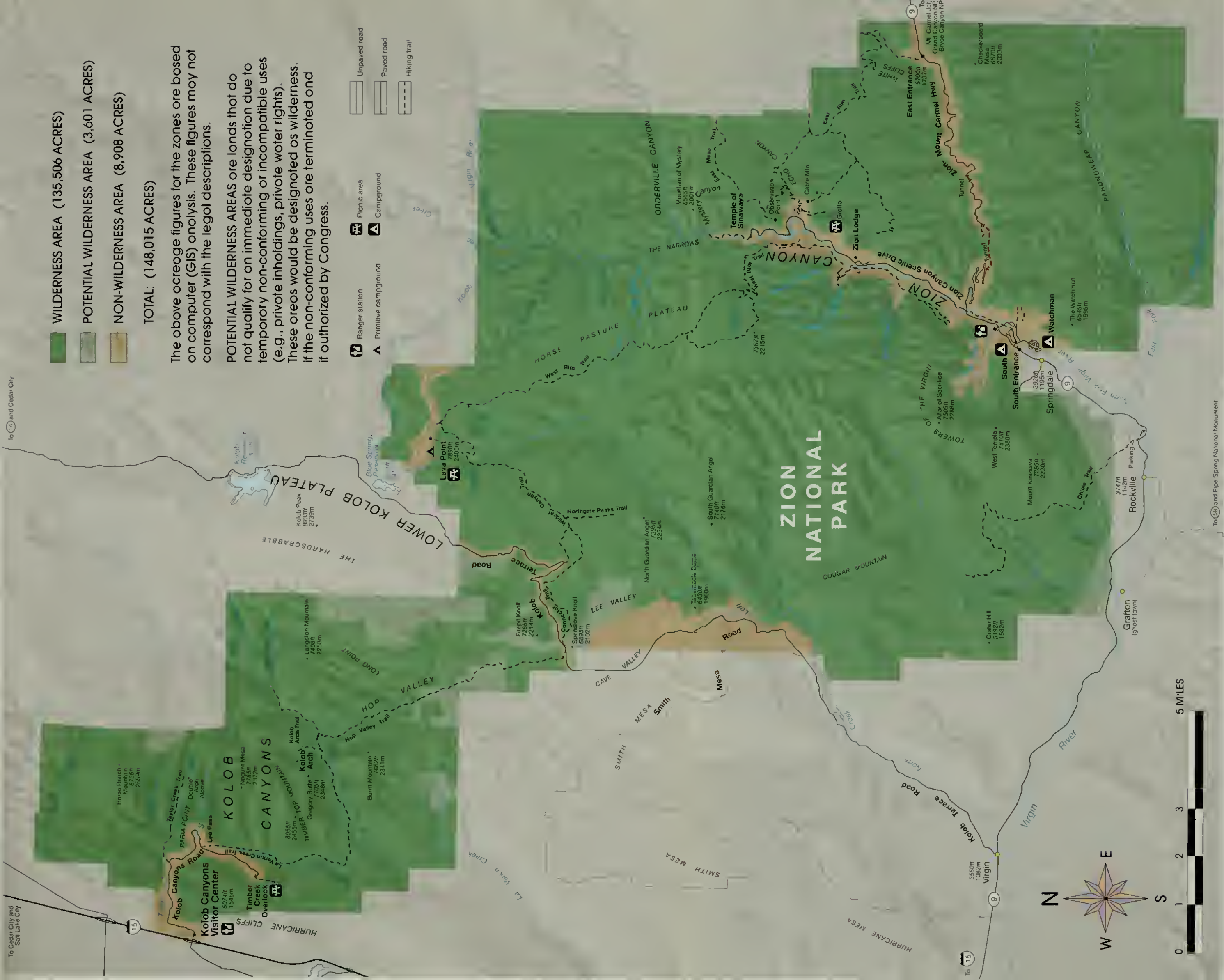
Priorities and Funding

Park managers would continue to implement the management strategies described under this alternative and under the "Park Policies and Practices" chapter over the next 15 to 20 years as funding becomes available. The National Park Service could establish partnerships with other agencies or groups to implement these actions; however, management emphases and related staffing allocations would be retained as identified in approved documents, such as the Zion "Resource Management Plan."

Cost Implications

Current costs of managing the park and costs of implementing any decisions made prior to this planning effort (such as implementing the transportation system in the main alternatives and are not covered under this canyon) would not vary between the plan.

The no-action alternative would be the least expensive for the National Park Service to implement because it does not require any new actions, and thus the Park Service would not incur additional costs.



The above acreage figures for the zones are based on computer (GIS) analysis. These figures may not correspond with the legal descriptions.

POTENTIAL WILDERNESS AREAS are lands that do not qualify for an immediate designation due to temporary non-conforming or incompatible uses (e.g., private inholdings, private water rights). These areas would be designated as wilderness, if the non-conforming uses are terminated and if authorized by Congress.

This map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners. Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

Wilderness - No Action

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THE PROPOSED ACTION

The proposed action is the plan the National Park Service is proposing to implement for Zion National Park over the next 15 to 20 years. Like all of the alternatives, the proposed action is intended to safeguard the future diversity of park resources and the quality of visitor experiences. Visitors would have opportunities to participate in a variety of recreational activities, ranging from social to wilderness experiences. Unlike the no-action alternative, under this alternative, park managers would make several changes to proactively address impacts that result from increased visitor use levels. For the first time, management zones would be applied throughout the park to identify desired resource and visitor experience conditions and to set the basis for determining visitor carrying capacities. Park managers would allow continued increases in overall park visitation, but would limit increased visits in certain areas to satisfy zone conditions. Other changes would be made to resolve several key concerns, such as the management of the existing research natural areas and Parunuweap Canyon.

GENERAL MANAGEMENT STRATEGIES

In the proposed action alternative, park managers would follow all of the desired conditions and strategies described in the “Park Policies and Practices” chapter, plus several additional management directions and strategies. These strategies relate to managing natural resources in general, supplying and conserving water, and managing visitor use and various levels and types of park development. New desired conditions and strategies for managing the North Fork of the Virgin River would also be implemented under this alternative.

GENERAL NATURAL RESOURCE MANAGEMENT STRATEGY

Park managers would pursue one additional general natural resource management strategy under the proposed action compared to the no-action alternative. This strategy reflects the need to gather additional information on resources affected by visitor use:

- The Park Service would conduct long-term monitoring as part of the implementation of the visitor experience and resource protection (VERP) process, and would implement the monitoring program upon approval of the proposed plan. (This strategy also relates to the strategy of developing indicators and standards, described below under “Visitor Use Management.”)

Water Supply and Conservation Strategies

In addition to the water quality and quantity strategies described in the “Park Policies and Practices” chapter, park managers would follow one other strategy under this alternative to maintain Zion’s water quality and improve water conservation in the park.

To evaluate the possibility of restoring springs in Zion Canyon and to explore water conservation techniques, the National Park Service would study water supply and treatment alternatives. This study would examine alternative ways for the National Park Service to obtain drinking water, including the procurement of treated water from Springdale and the construction of a new water treatment plant inside the park.

Natural Resource Mitigation Measures

Under this alternative, the National Park Service would follow all of the natural resource mitigation measures described under "Park Policies and Practices." In addition, park managers would apply the following measures to avoid or minimize impacts on natural resources.

- Where possible, new facilities would be built in previously disturbed sites; e. g., picnic areas would be in previously disturbed sites along the Zion-Mt. Carmel Highway. New developments also would be built away from microbiotic soil crusts
- In areas where spotted owls are known or suspected to occur, prior to any construction, park managers would evaluate the specific locations for new developments, such as picnic areas and trails, in consultation with the U.S. Fish and Wildlife Service. No new facilities would be built during the owl breeding/nesting season (March 1 - August 31).
- No new designated camping sites would be located in Mexican spotted owl territories. If survey results indicated that visitors were camping near nest or roost sites, restrictions would be placed on camping in those areas.
- Park staff would survey proposed development sites for rare plants and would relocate new developments if rare plant populations were present. Similarly, trails and routes would be located to avoid impacts on rare plants.
- Site specific measures, such as the placement of silt fencing, retention and replacement of topsoil, revegetation of sites, and selective scheduling of construction activities, would be taken to reduce runoff from construction sites. Workers also would be required to control dust, and all construction machinery would be required to meet air emission standards. Restoration efforts would be scheduled to minimize impacts on downstream water users and to avoid the Virgin spinedace spawning periods.
- Wading and hiking in streams with Virgin spinedace would be managed to minimize impacts on the fish.
- Visitor use in side canyons off Parunuweap Canyon would be managed to avoid disturbing desert bighorn sheep. No use would be permitted in the canyon during the lambing period, from January 15 to June 15.
- To minimize impacts of trail erosion and social trailing on microbiotic crusts in developed areas, park staff would place barriers, erect signs, and rehabilitate areas.
- To help minimize the spread of nonnative plants, park managers would only permit the use of weed-free materials and equipment during the development of future facilities.

Visitor Use Management Strategies

Park staff would manage visitor use to reflect desired resource conditions and visitor experiences as expressed in this plan and as determined through subsequent specific plans using VERP standards. The Park Service would develop measures (indicators and standards) in a VERP implementation plan to ensure resources and visitor experiences are not impaired by excessive or inappropriate visitor use. If standards were violated, actions would be taken to address visitor impacts, using the methods that best assure resource protection. (See the "Park Policies and

Practices" chapter regarding methods that may be used.)

Until the VERP implementation plan was completed, most of the existing visitor use management policies described in the no-action alternative would remain in effect. However, the Park Service would change the following management policies in this alternative to reflect desired visitor experience and resource conditions described in the zone definitions:

- Group sizes in the backcountry would vary from a maximum of eight people per group in primitive zones to five people in pristine zones.

- Encounters with other groups in the back-country would vary from a maximum of 12 groups per day in primitive zones to usually no other groups in pristine zones.
- For horse parties in the primitive zone, the total number of people and horses combined would not exceed eight.

Strategies for the Levels and Types of Park Development

All of the strategies described under the “Park Policies and Practices” chapter regarding development in the park would apply in the proposed action. The National Park Service would build all of the management facilities called for in the 1994 *Development Concept Plan, Zion Canyon Headquarters* (NPS 1994), such as the research facility in the south entrance – main Zion Canyon area. In addition, the Park Service would pursue several additional strategies regarding new development in the park. These strategies are intended to minimize new developments within the park, and encourage the construction of visitor facilities outside the park.

- With the possible exception of the Lava Point campground, no new camping facilities would be built in Zion’s front-country areas, including campgrounds, campsites, or infrastructure (e.g., roads, utilities, tables, fire rings) that supported overnight camping in Zion Canyon, along the Kolob Canyons and Kolob-Terrace Roads, or along the Zion-Mt. Carmel Highway. In addition, picnic areas would not be converted into campgrounds. At Lava Point, the existing six-site campground could be expanded up to twelve sites. If and when these new campsites are built, they would be contiguous to the existing campground.
- New picnic sites may be built only in previously disturbed areas at selected trailheads or pullouts throughout the park, and at Lava Point and the Kolob Visitor Center.
- No new food service buildings would be constructed in the park.
- No new roads would be built in the park, except possibly for short access roads to park facilities. The National Park Service would continue to coordinate and cooperate with the county with regard to maintenance of the Kolob-Terrace Road.
- Park workers would continue to staff collection stations and collect associated entrance fees on the south and east boundaries of the park (along the Zion-Mt. Carmel Highway), and at Kolob Canyons. In addition, the National Park Service would study the feasibility and advantages of establishing an entrance/fee collection station along the Kolob-Terrace Road.
- A focused visitor facility may be built near the park’s east boundary, which would provide interpretive and orientation services to visitors.

Zion Canyon Lodge Strategies

Under the proposed action, the National Park Service would follow the same desired conditions and strategies for the Zion Lodge as under the no-action alternative. Park managers would continue to work with the concessioner to ensure that the quality of the services appropriate to the historic experience was maintained. The commercial services implementation plan would provide more detailed guidance on operation and administration of the lodge, and thus ensure that management of the lodge was consistent with desired conditions for this area (see also the “Visitor Use Strategies”).

Desired Conditions and Strategies for the Management of the North Fork of the Virgin River

New desired conditions and strategies for the North Fork would apply under the proposed action, which differ from those described in the no-action alternative. In particular, the two alternatives differ in the approaches to visitor use management and the restoration of the floodplain. Restoring parts of the river would be an important step in preserving the dynamic processes that formed Zion Canyon and would maintain and restore habitat for riverine and floodplain species.

- *Desired Conditions:* The North Fork continues to provide high quality experiences for visitors. Visitor use levels and activities are consistent with park purposes — visitors enjoy the river without impairing resources. Conflicts between users are minimal. The river's water quality and natural biological community are enhanced or maintained and protected. It also restores portions of the channel of the North Fork, particularly in the vicinity of Zion Lodge, to a more natural morphologic condition, considering such factors as width/depth ratios, gradients, riffle and pool structure, sinuosity, and hydrologic connection with its floodplain. Floodplain habitat conditions are also restored through additional measures, including management of exotic plants and wildlife, protection and planting of native flora, and education of visitors.
- *Strategies:* The National Park Service would develop a river management plan(s) to address important water resource issues in the park, including visitor uses and the restoration of sections of the North Fork's floodplain. Actions would be consistent with management zoning and with the recommended classification of the river

below the Temple of Sinawava as recreational under the Wild and Scenic Rivers Act.

The North Fork management plan would examine different strategies and actions for managing river uses (e.g., use levels, timing of use, educational efforts) to protect riparian and riverine resources and ensure continued visitor enjoyment of the river. Actions considered as part of this plan could include designating river access points, allowing river recreation only at times when the potential for resource damage or safety hazards was low, and limiting the number of visitors.

Restoring part of the North Fork could be addressed in the same or different river management plan or in a different plan. The plan would:

- identify objectives for any river restoration effort (e.g., the "natural" conditions that constitute a restored river given its zoning and wild and scenic river status)
- indicate information needs (e.g., identification of the locations of all park infrastructure in or near the river floodplain, analysis of relocation and protection costs)
- identify and assess alternative approaches for restoring the river
- determine when, where, and how the river would be restored

The plan would examine the removal of levees and riverbank-protection structures (revetments) dating back to the 1920s that prevent the river from using the floodplain. These structures are primarily in place near the Zion Lodge. Park managers would evaluate alternative restoration approaches, ranging from allowing levees to slowly

deteriorate over time to removing the levees, along with their effects on flood safety, floodplain resources, visitor use, and costs. Depending on the approach selected, the desired condition would be achieved in varying time spans.

Park managers also would evaluate other in-stream structures located between the Temple of Sinawava and the southern park boundary, such as gabions, pipeline crossings, and cemented boulders, for their potential removal or replacement with more biologically, hydrologically, and aesthetically sensitive treatments. River-diversion structures associated with the water rights of the National Park Service and Springdale would remain in place. The river management plan would need to include an examination of how restoration efforts could affect visitor access to the river and its floodplain and the potential impacts on existing park infrastructure.

ZONE ALLOCATIONS AND RELATED ACTIONS

The Proposed Action map shows how the different management zones would be applied throughout the park. The map shows the zones as both large polygons and as narrow corridors that follow trails, routes, and drainages.

Pristine zones would cover most of Zion, about 83% of the park. Primitive areas would cover about 11% of the park, primarily in the Middle and North Forks of Taylor Creek, the area around Lava Point and Horse Pasture Plateau, and the slopes of Zion Canyon. Although most of the park's backcountry would be primitive or pristine zones where use levels would be low, the vast majority of the backcountry is not accessible to most visitors due to the park's steep topography. These zones would be consistent with most of the park being proposed as wilderness and with

use levels the backcountry is likely to receive in the future.

Under the proposed action, about 3% of the park would be research natural areas, including Goose Creek, Shunes Creek, Crazy Quilt, the slickrock area adjacent to Gifford Canyon, the southeast corner of the park, and several isolated mesa tops.

The transition, frontcountry, and administrative zones would be in readily accessible areas that are not proposed as wilderness. Transition zones, covering about 1% of the park, would encompass the floor of Zion Canyon, part of the Narrows, Timber Creek Overlook trail, Sand Bench trail, the Weeping Rock trail, Observation Point trail, part of the Hidden Canyon trail, and the lower part of the West Rim trail. Frontcountry high development zones, encompassing about 0.4% of the park, would include the south park entrance, the Zion Canyon road to the Temple of Sinawava, the Zion-Mt. Carmel Highway, and the entrance to the Kolob Canyons. The Park Service would designate about 0.5% of the park as frontcountry low development zones, including the Kolob Canyons Road, Kolob-Terrace Road, Smith Mesa Road, Lava Point, and the Zion-Mt. Carmel Highway by the east entrance. Administrative zones would comprise about 0.2% of the park, primarily in Oak Creek and near the entrances to the Kolob Canyons and Lava Point.

The remainder of this part describes how different areas of the park would be zoned and the actions that could occur under the proposed action. The actions are those the planning team believe to be the most likely to take place over the next 20 years in the park, given the zone definitions, what already exists in the park, and the park's environmental constraints. Where possible, all of the proposed new facilities would be built in already disturbed areas, and mitigation measures would be taken to avoid sensitive

areas, such as threatened and endangered species habitat and archeological sites.

Frontcountry Areas

Kolob Canyons Road Area. The entrance area would be a frontcountry high development zone. Park managers could take some actions to help this area better meet desired zone conditions, such as expanding the existing Kolob visitor center, adding parking, and possibly developing an outdoor exhibit area/plaza, an associated picnic area, and a nature trail.

The Kolob Canyons Road itself (the road corridor from the entrance gate to the Timber Creek Overlook) would be a frontcountry low development zone. If traffic in this area increases in the future, park staff would take action to ensure that the opportunity for visitors to have a rural experience was maintained, such as by limiting the number of private vehicles or offering a shuttle to transport visitors. Parking spaces at the trailheads for the Middle and South Forks of Taylor Creek and the Lee Pass trails also would have to be reduced to reflect trail-use capacities. (These trails are all zoned primitive.)

To help this area better meet the desired zone conditions, the existing parking lots could be improved, such as by installing restrooms.

The Timber Creek Overlook trail would be a transition zone. This developed high use trail already meets transition zone conditions. Bicycling and horseback riding would still be prohibited, but several other actions could be taken to better meet zone conditions, such as upgrading the trail to meet higher standards (e.g., paving the trail and/or widening it) and adding interpretive signs along the trail.

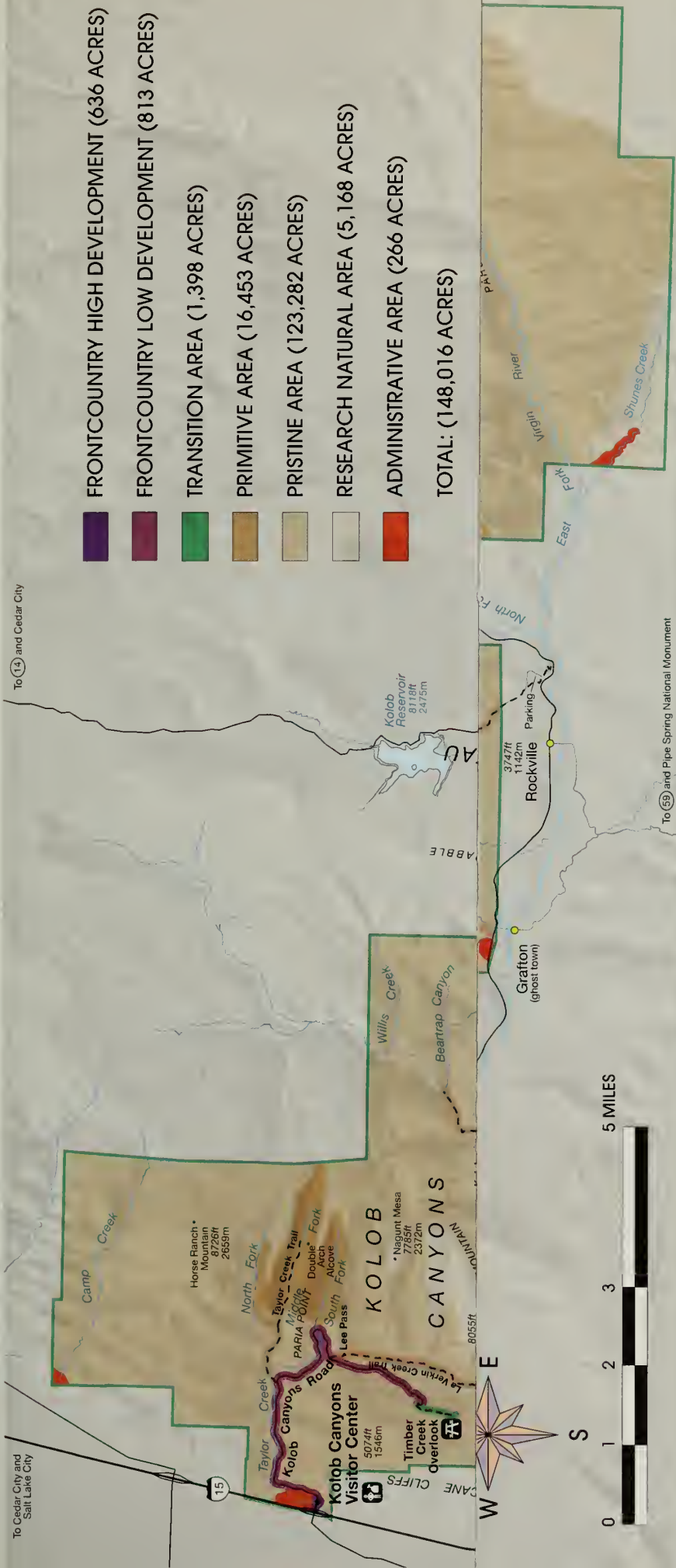
The area to the north of the entrance, which includes employee housing, a maintenance shed, a right-of-way, and water collection tanks, would be an administrative zone. This

would allow managers to make a number of improvements to support the increase in visitor services and facilities in this area. Particular actions that park managers could take in this area include adding administrative offices and/or maintenance facilities. (If employees need housing, they would need to find accommodations outside the park boundary.)

Kolob-Terrace Road Area. The portion of the Kolob-Terrace Road corridor within the park would be a frontcountry low development zone. If visitor numbers increase here in the future, actions would be taken to ensure that a rural setting was maintained (e.g., offer a shuttle to transport visitors). Within the limited space available for new facilities, existing trailheads could be improved to better meet the desired zone conditions, but no new trailheads would be built. The improvements could include adding a few picnic sites in the already disturbed areas at the Hop Valley and Wildcat Canyon trailheads.

With the agreement of the Bureau of Land Management (BLM), the Park Service would build a focused visitor facility/ranger residence/office and restrooms on BLM lands near the park boundary at North Creek. The staff at this facility would provide visitors with park information, issue permits, possibly collect fees, and establish a Park Service presence on this side of the park. (Park managers would prepare a site plan and assessment of the environmental impacts of this facility at a later time.)

Lava Point Area. Most of this area, which includes the Lava Point campground and picnic area, as well as the road to the West Rim trailhead, would be a frontcountry low development zone. If visitor numbers increased, actions would be taken to ensure that opportunities for visitors to have a rural experience were still available, such as by limiting the number of private vehicles or offering a shuttle to transport visitors. Park

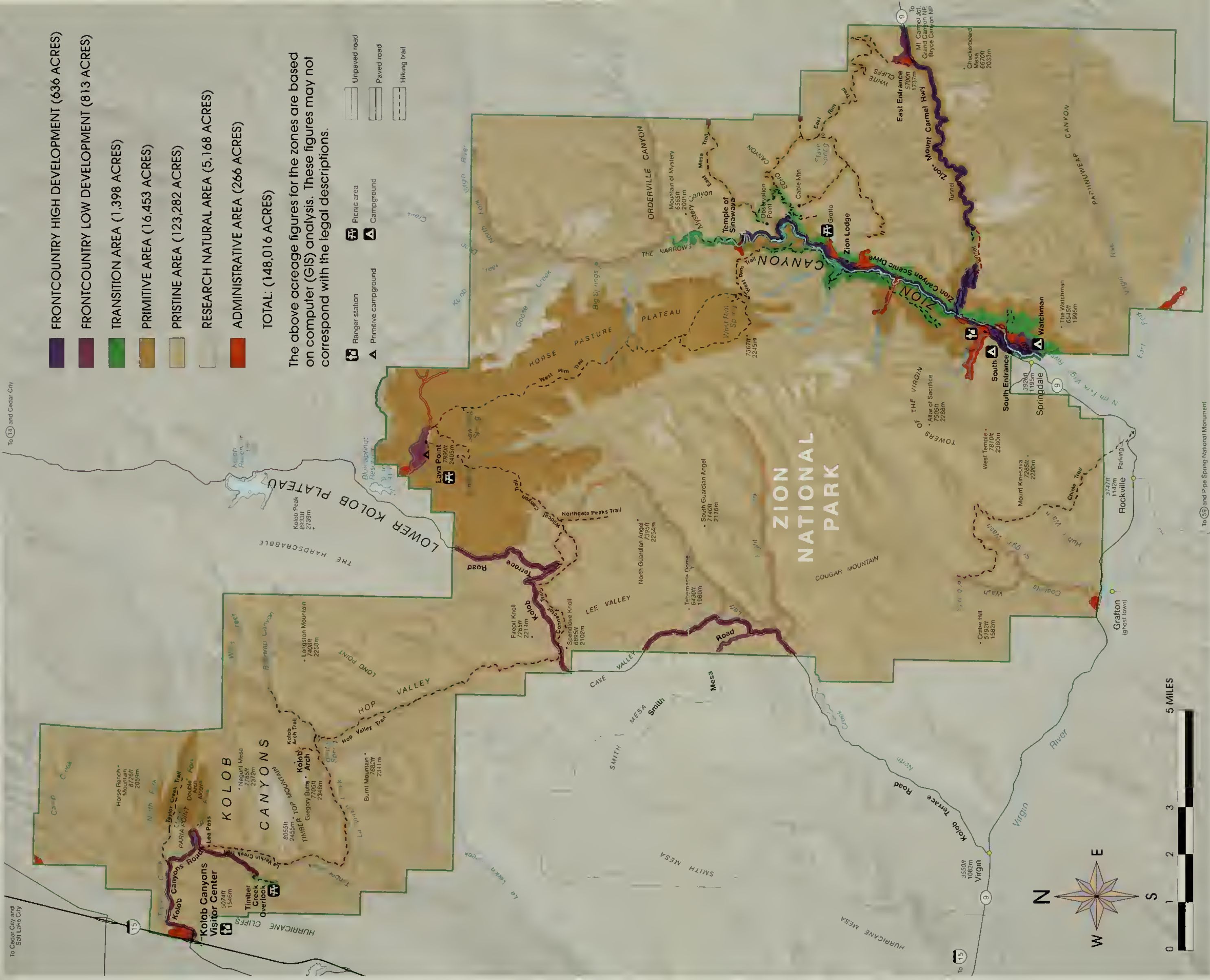


This zoning map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners.

Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

Proposed Action

Zion National Park, Utah
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This zoning map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners. Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

Proposed Action

Zion National Park, Utah

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managers could take several other actions to help this area better meet desired zone conditions, including

- build a new focused visitor facility and add nature trails
- expand the existing Lava Point campground by up to six sites (doubling the existing capacity) and possibly make water available
- add up to four new picnic sites (for a cumulative total of ten)

The road east of the gate at the West Rim trailhead, including all three forks leading onto private land outside of the park, would be administrative zones. This zoning would allow continued motorized access by administrative vehicles, the private landowners, and their guests. The area to the north of the entrance also would be an administrative zone to support management of this part of the park. The Park Service would demolish the Firepit Knoll ranger residence and replace it with a new residence at Lava Point.

South Entrance and the Main Zion Canyon Area. This area of the park would be a mix of frontcountry high development, transition, and administrative zones.

The areas zoned frontcountry high development would include the road corridor from the south entrance to the Temple of Sinawava, much of the Zion Canyon Lodge area (including the parking lots, lodging facilities, and restrooms), and the Grotto. Most of the south entrance area itself (including the campgrounds, the segment of the Pa’rus trail and North Fork of the Virgin River running through the campgrounds, and the forthcoming visitor center/shuttle staging site) would be front country high development zones. To better meet zone conditions, park staff could add picnic sites in disturbed areas.

Most of the canyon bottom on either side of the road corridor, including the segment of the

North Fork of the Virgin River north of the campgrounds to the junction with Orderville Canyon, would be transition zones. Trails and routes that would be transition zones include:

- the segment of the Pa’rus trail extending north of the campgrounds
- the Watchman and Sand Bench trails
- the lower, middle, and upper Emerald Pools trails
- a segment of the West Rim trail
- the trail to Angel’s Landing
- part of the Echo Canyon trail
- part of the Hidden Canyon trail
- the Observation Point trail
- Riverside walk
- the Narrows from the end of the Riverside walk to the junction of Orderville Canyon.

Bicycling and horseback riding would not be permitted except for trails where the uses are currently allowed (i.e., bicycling on the Pa’rus trail, and concessioner-led horseback riding on the Sand Bench trail). The portion of the river zoned transition would need to be restored, as per the desired conditions/strategies discussed earlier, but the level of restoration could vary from simple to complex — the zoning would not require specific restoration actions. No other management actions would be necessary to ensure that these areas were consistent with transition zone conditions. Park staff could upgrade trails to higher standards to better meet zone conditions, however.

Several areas would be administrative zones, including: Sammy’s Canyon (site of the shuttle maintenance facilities), the Watchman employee housing area, the old waste treatment plant, the existing visitor center/headquarters, the Oak Creek employee housing and maintenance area, the Pine Creek employee housing area, the Birch Creek

concessioner support facilities, water collection structures at springs in Zion Canyon, and concessioner support facilities around the Zion Canyon Lodge. No additional actions would be considered at this time beyond what was discussed under the no-action alternative and in "Park Policies and Practices," including building the new shuttle maintenance facility at Sammy's Canyon and a research facility in the vicinity of the park headquarters. Any future development would be accomplished in a manner consistent with the zone descriptions.

East Entrance and the Zion-Mt. Carmel Highway Area. The road corridor and east entrance area would be frontcountry high development zones. Park staff could take several actions to better meet desired zone conditions, such as

- providing focused visitor facilities; one or two short nature trails; and a few picnic sites, restrooms, and associated parking spaces if necessary in disturbed areas at existing pulloffs and trailheads along the road
- initiating a voluntary shuttle to better transport visitors to this area and reduce parking congestion, depending on the recommendations of a future transportation plan
- removing and rehabilitating pulloffs along the road that are contributing to unacceptable resource impacts

The short access road to the East Rim trailhead and a large area north of the east entrance would be frontcountry low development zones. To help this area better meet desired zone conditions, the Park Service could build a focused visitor facility if a new location cannot be found outside the park. The trailhead also could be improved by adding parking and picnic sites for a total of ten sites — the maximum number allowed in a frontcountry low development zone.

The Canyon Overlook trail would be a transition zone. Park staff would continue to prohibit bicycling and horses on this trail due to safety concerns. Actions that could take place to better meet desired conditions for this area, include upgrading the trail to higher standards (e.g., make the trail wider) and adding more interpretive signs along the trail.

The existing employee housing area and water collection tank at the east entrance would be an administrative zone. To support the increase in visitor services and facilities in this area, park operations could be expanded by adding administrative offices and/or maintenance facilities.

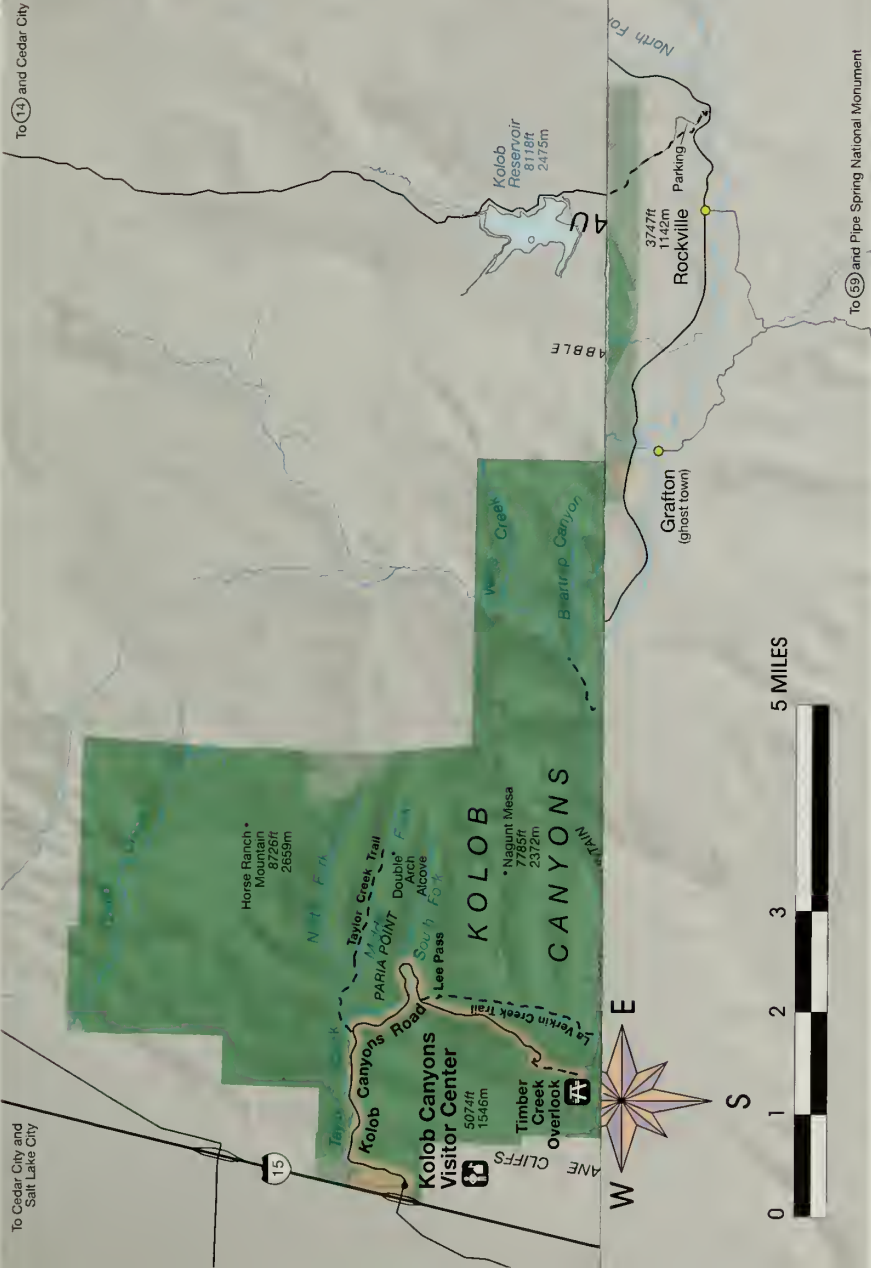
Other Frontcountry and Administrative Areas. Just outside the proposed wilderness, on the park's eastern boundary, two areas would be frontcountry low development zones. Trailheads and parking areas would be developed in these areas to improve visitor access to the East Mesa and East Rim trails and eliminate the need for visitors to park on private land outside of the park.

Two administrative zones would be established, one covering about a quarter of a mile at the mouth of Camp Creek and the other covering about three-quarters of a mile along Shunes Creek. These areas have private water rights and are regulated to facilitate use by the water right owners.

Proposed Wilderness

Under the proposed action, the National Park Service would propose a total of 139,295 acres (94% of the park) for wilderness designation (see the Wilderness — Proposed Action map). The Park Service also would modify the 1974 wilderness proposal to reflect acquisitions of several inholdings and to make the wilderness boundaries easier to identify on the ground. Additionally, several changes would be made to the proposed wilderness boundaries to

To Cedar City and Salt Lake City



WILDERNESS AREA (139,295 ACRES)

POTENTIAL WILDERNESS AREA (5,546 ACRES)

NON-WILDERNESS AREA (3,175 ACRES)

TOTAL: (148,016 ACRES)

The above acreage figures for the zones are based on computer (GIS) analysis. These figures may not correspond with the legal descriptions.

POTENTIAL WILDERNESS AREAS are lands that do not qualify for an immediate designation due to temporary non-conforming or incompatible uses (e.g., private inholdings, private water rights).

This map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners. Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

Wilderness - Proposed Action

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ensure that the zones in this alternative and the wilderness boundaries were congruent.

The wilderness proposal would include all areas of the park zoned pristine, primitive, or research natural area, except for the area south of the powerline corridor in the Coalpits area. The spur road near Lava Point would be added to the proposed wilderness, since this area has not been used for motorized access in recent years and the roadbed is returning to its natural state. Because the transition zone is incompatible with proposed wilderness designation, the proposed wilderness boundary would no longer include the following trail sections: the Timber Creek Overlook trail; the Observation Point trail; a segment of the Narrows from a quarter mile below Orderville Canyon up to the actual junction with Orderville Canyon; the last half mile of the Watchman trail; two miles of the Sand Bench trail; and the quarter-mile Upper Emerald Pools trail. The land zoned frontcountry low development for the East Rim and East Mesa parking lots and trailheads also would be removed from the proposed wilderness boundary.

Primitive Zones. The primitive zone would apply to 16,351 acres in the proposed wilderness, including numerous trails and routes. To meet desired zone conditions, managers would occasionally need to limit visitor numbers on the Narrows route from the northern park boundary to the junction with Orderville Canyon, and the Middle Fork of Taylor Creek, and La Verkin Creek trails. In the future, managers may need to place limits on visitor use elsewhere in the primitive zones, if visitor use levels increased to the point where desired conditions are not being met.

To better meet conditions within the primitive zones, visitor access could be improved by adding some trails or clearly delineated routes in areas that were able to withstand increased human use (e.g., areas where there are no spotted owls or other sensitive species

habitat). The topography of the areas adjacent to Lava Point and Wildcat Canyon, and on the Horse Pasture Plateau would be most conducive to improved access by the upgrading of existing trails and routes in these areas.

Narrow, unsurfaced short trails could be added in some of the lower reaches of the canyons on either side of the Zion-Mt. Carmel Highway. (These short trails would not extend into the canyons because the canyons would be pristine zones.) Designated campsites in areas outside of spotted owl protected activity centers also could be established.

Pristine Zones. The Park Service would apply the pristine zone to 117,776 acres in the proposed wilderness, which would include a number of known routes. In general, existing conditions already meet the undeveloped, very low use nature of this zone. However, to ensure that the probability of encountering other people would be very low to zero, managers would need to limit visitor numbers on sections of the following routes and trails: Camp Creek, Willis Creek, Beartrap Canyon, upper Coalpits Wash, Dalton Wash, and Mystery Canyon. In the future, managers may need to place limits on visitor use elsewhere in the pristine zones if visitor use levels increase to the point where desired conditions are not being met.

The large area east and west of the road in the vicinity of Grapevine Wash, as well as the existing Firepit Knoll administrative area and its associated access road, also would be pristine zones. Since facilities, roads, trails (except for faint hiking routes or bolts on climbing routes), and other signs of human use are not consistent with the desired conditions of the pristine zone, the ranger residence and road would be removed and the area restored to natural conditions when the inholdings were acquired. The restoration could be done by allowing the area to naturally recover or by taking more active measures such as planting native plants. National register eligible or listed historic structures, would be maintained,

Management Zone Visitor Use Limits

Visitor use limits generally would not be imposed in the frontcountry high and low development zones and the transition zone, unless required by facility design capacities or to protect resources. The primitive, pristine, and research natural area zone conditions would limit the number of people who could enter these areas.

In the primitive zone, group sizes for day and overnight use would be limited to eight or fewer individuals (in horse parties, the total number of people and horses combined would not exceed eight). No more than 12 groups generally would be encountered per day in the zone.

In the pristine zone, the size of groups would be limited to no more than five people. Visitors would usually not expect to encounter other groups in the zone.

In the research natural area zone, authorized research and guided educational group sizes would be limited to no more than eight people, and recreational use would be prohibited.

but would not be used for administrative or other purposes.

Like the Grapevine Wash and Firepit Knoll areas, there may be other places zoned pristine under this alternative that do not meet desired conditions. If such areas were found, park managers would have to remove the evidence of human use and restore these areas to natural conditions. As noted above, faint hiking routes, bolts on climbing routes, and national register eligible or listed resources, including historic structures, would be allowed to remain because they are allowed in the pristine zone. These areas would be restored either by allowing the areas to naturally recover or by taking active measures such as planting native vegetation.

Although the Parunuweap Canyon area would be a pristine zone and no longer closed to the public, park managers would manage the canyon differently than other pristine zones. For example, Parunuweap Canyon would be a special-fee area. Park staff would permit

public access into the canyon only under the following conditions:

- The frequency and type of trips permitted in this area would depend on whether a reliable access route could be established across private land into the lower end of the canyon.
- All trips would be NPS or NPS-sanctioned guided interpretive trips.
- Day trips would be emphasized, and group size would be limited to no more than nine people, including the guide.
- Overnight use may be permitted, but camping would be allowed only in designated areas, and group size would be limited to five individuals, including the guide.
- To ensure that riparian resources are protected, all groups would follow a designated trail, which would have river access points.
- Public access would not be permitted from January 15 through June 15, which would cover the majority of the bighorn sheep lambing, Southwest flycatcher nesting, and Virgin spinedace spawning periods. Park staff may impose other closure periods based on other sensitive resources.

Research Natural Areas

The research natural area zone would apply to 5,168 acres, which would make up about 3% of the park. The planning team would apply this zone to areas the team believed to be more suitable and that covered a greater variety of ecological communities than the currently designated research natural areas. These also are areas that park staff could manage more consistently with the intent of the research natural area national network. The research natural areas in the proposed action would include an undisturbed watershed (Goose

Creek), some isolated mesa tops (e.g., Timber Top, Gregory Butte, Burnt Mountain, Greatheart Mesa, Crazy Quilt), selected hanging gardens in Parunuweap, the Grotto, Weeping Rock, and North Menu Falls, a representative area of slick rock between the Zion-Mt. Carmel Highway and Parunuweap Canyon, a relict piñon-juniper forest in the southeast corner of the park, and a riparian corridor (Shunes Creek). To manage these areas to meet desired zone conditions, managers would close them to public use, with the exception of specially authorized guided educational trips. Other actions park managers could take in this zone include:

- providing off-site interpretation on the values of these areas
- allowing minimal trail and campsite construction if essential to provide access to temporary research equipment (e.g., access to a temporary water gauging station)
- installing temporary research equipment if no practical alternative exists for achieving research goals and where consistent with the Wilderness Act

PROPOSED BOUNDARY ADJUSTMENTS AND EASEMENTS

The National Park Service would propose several boundary adjustments and the acquisition of access and conservation easements in this alternative. Congressional authorization would be required for the National Park Service to pursue the boundary adjustments and to acquire easements on private lands.

Under section 604(b)(4) of the National Parks and Recreation Act (PL 95-625), Congress specifically directed the National Park Service to identify proposed boundary adjustments in park general management plans. The Park Service would propose boundary adjustments

for Zion National Park through land transfers from the Bureau of Land Management. The accompanying map shows the general locations of these boundary adjustments. The planning team has determined that all of the proposed boundary changes satisfy the NPS criteria for boundary adjustments. (The evaluation of the boundary proposals is on file at park headquarters.)

The proposed boundary adjustments also must meet the requirements of Public Law 101-628. Section 1216 requires an evaluation of each proposed addition, including an assessment of the impact of the boundary adjustment. Section 1217 requires the National Park Service to consult with others on the proposal, to estimate the cost of acquisition, and to identify the relative priority for acquisition of each parcel. This plan does not address these legislative requirements; however, the legislative proposal and accompanying support materials that are submitted to Congress would address these requirements.

BLM Land Transfers

The National Park Service would propose four BLM wilderness study areas adjacent to Zion, totaling 640 acres, to be included in the park boundary (see the Proposed Park Boundary Adjustments and Adjacent Landownership map). These areas include: Watchman (480 acres); Middle Fork of Taylor Creek (40 acres); Beartrap Canyon (40 acres); and the southern part of the Goose Creek area (80 acres).

These parcels are small, isolated areas managed by the Bureau of Land Management. The boundary changes would bring into the park the heads of canyons or incorporate complete drainages and other prominent features that visitors already associated with Zion. The changes also would enable park staff to manage all of the subject canyons, provide increased protection for other natural and

cultural resources in the park (e.g., Mexican spotted owl habitat), provide visitors with additional challenging hiking opportunities, and promote more efficient management of the areas. These land transfers would be consistent with the recommendations in the *Dixie Resource Area Resource Management Plan* (BLM 1998).

In addition to these areas, the Park Service would propose approximately 311 acres on the adjacent Rockville Bench for transfer into the park. The boundary adjustment would preserve the park's scenic qualities, eliminate or mitigate impacts on its natural and cultural resources, and promote more efficient management of the park. Thus, the proposal would satisfy the NPS criteria for boundary adjustments. Both the Bureau of Land Management and the town of Rockville would be amenable to this land transfer.

Acquisition of Access Easements

An easement is an interest in property restricting certain uses of land or giving a right to another entity to make limited use of the land. An access easement gives the public a right to pass through a property owner's land. All current and future owners of the land would be legally bound to follow the provisions of the easement agreement.

The National Park Service would seek nine access easements, totaling approximately 15 miles, on lands outside the park boundary (see the Proposed Park Boundary Adjustments and Adjacent Landownership map). The easements include:

- the North Fork of the Virgin River/Virgin River Narrows (3 miles)
- Orderville Canyon (0.25 mile)
- Ponderosa Ranch area (two separate easements, totaling 3 miles)
- Anasazi Plateau (1.3 miles)

- Camp Creek (1 mile)
- Horse Ranch Mountain area (three separate easements totaling 6.5 miles)

The Park Service believes the easements will ensure that visitors and park personnel continue to have access in perpetuity to relatively inaccessible parts of the park. Several of the easements provide access to existing trail-heads and popular routes. Without these easements, visitor access could be severely restricted and park managers would not be able to adequately protect and preserve park resources or complete resource management projects and studies in remote parts of the park.

Acquisition of Conservation Easements on Adjacent Private Lands

As noted in "Affected Environment," private lands abut Zion's boundary in many locations. Most of these areas are undeveloped, but several landowners are developing or are considering developments on their property. Developments or other uses on these parcels could adversely affect the scenic qualities of the park and visitor experiences. Three privately-owned adjacent areas are of particular concern:

- the Kolob Terrace area south of Spendlove Knoll (1,500 acres)
- the Anasazi Plateau subdivision area east of the Rockville Bench (400 acres)
- parcels in the North Fork of the Virgin River near the northeast corner of the park (320 acres)

The National Park Service would seek legislative authority to acquire conservation easements for these areas and for other potential areas near the park on a willing-seller basis, or would encourage local governmental entities or nonprofit groups to acquire these easements.

PROPOSALS FOR WILD, SCENIC, AND RECREATIONAL RIVER DESIGNATION

As part of the planning process for Zion, a study was conducted to determine whether any of the rivers in the park and on six adjacent Bureau of Land Management river segments should be recommended for inclusion in the national wild and scenic rivers system. Appendix F contains this wild and scenic river evaluation. The planning team determined that

five rivers and their tributaries would be eligible and suitable for inclusion in the system:

- the North Fork of the Virgin River above and below the Temple of Sinawava (two segments)
- the East Fork of the Virgin River
- North Creek
- La Verkin Creek
- Taylor Creek

TABLE 1: PROPOSED CLASSIFICATION OF RIVERS IN ZION NATIONAL PARK AND ON ADJACENT BLM LANDS

| River | Classification | River | Classification |
|---|----------------|--|----------------|
| North Fork of the Virgin River, above the Temple of Sinawava | Wild | North Creek | Wild |
| Kolob Creek (incl. BLM segment) | Wild | Wildcat Canyon | Wild |
| Goose Creek (incl. BLM segment) | Wild | Right Fork | Wild |
| Imlay Creek | Wild | Left Fork | Wild |
| Orderville Canyon | Wild | Grapevine Wash | Scenic |
| Deep Creek | Wild | Wolf Springs Wash | Scenic |
| Mystery Canyon | Wild | Pine Spring Wash | Scenic |
| North Fork of the Virgin River below the Temple of Sinawava | Recreational | Russell Gulch | Wild |
| Birch Creek Canyon | Wild | Little Creek | Wild |
| Pine Creek | Wild | La Verkin Creek | Wild |
| Oak Creek | Recreational | Willis Creek (incl. BLM segment) | Wild |
| Heaps Canyon | Wild | Beartrap Canyon (incl. BLM segment) | Wild |
| Behunin Canyon | Wild | Currant Creek | Wild |
| Echo Canyon | Wild | Cane Creek | Wild |
| Clear Creek | Recreational | Timber Creek | Wild |
| East Fork of the Virgin River | Wild | Hop Valley Creek | Wild |
| Shunes Creek (incl. BLM segment), excluding the segment from the water diversion to the western park boundary | Wild | Taylor Creek | Wild |
| Shunes Creek from the western park boundary to the water diversion | Recreational | North Fork | Wild |
| | | Middle Fork From east of the park boundary along the Kolob Canyons Road for 1 mile | Scenic |
| | | The rest of the Middle Fork (including the BLM segment) | Wild |
| | | South Fork | Wild |

All of these rivers and their tributaries would be proposed for wild, scenic, and recreational river designation under the proposed action. Table 1 lists the proposed classifications for the rivers and their tributaries. (Tributaries are listed beneath the main stems.) See the Wild and Scenic Rivers map for locations of the rivers and their tributaries.

IMPLEMENTATION

Priorities and Funding

The National Park Service would implement new developments and management actions proposed under this alternative over the next 15 to 20 years as funding becomes available. The Park Service would establish partnerships with other agencies or groups to implement several actions described in this alternative. The management emphasis would shift under the proposed action, requiring a reallocation of staff among the different park programs.

Given adequate funding, the highest priority would be given to implement actions that serve the following functions:

- address crucial resource protection needs
- address visitor and employee safety concerns
- remedy serious infrastructure concerns
- accommodate immediate interpretation or visitor use needs

Priority actions also must be accomplished before subsequent steps are taken, and could be accomplished fairly quickly with relatively little time and money.

Future Planning and Research Needs

Park managers would prepare several “step-down” implementation plans and studies following the completion of the *General*

Management Plan. These more detailed implementation plans would describe how the Park Service would achieve the desired conditions in the *General Management Plan* by describing specific actions park managers intend to take in Zion to ensure that resources were protected, and visitors continued to have opportunities for high quality experiences. The Park Service would seek public input in preparing all of these plans and would prepare additional environmental documentation as needed to comply with the National Environmental Policy Act.

As discussed earlier, a VERP implementation plan would be prepared, which would identify specific indicators and standards for managing visitors. Descriptive information would need to be collected to determine wilderness, social, and resource indicators and standards and accurately measure social and resource conditions in selected areas throughout the park. This information also could serve as a baseline against which to assess changing social conditions.

Based on an in-depth study of the park’s existing information (Vande Kamp 1998), the following are the highest VERP social data needs for the park:

- accurate counts of the number of visitors (and groups of visitors) who are currently using specific areas in Zion’s proposed wilderness
- the number of encounters experienced by current visitors
- the number of parties camped within sight or sound of current overnight campers
- information about specific sites and activities where the presence of other visitors most clearly detracts from experience quality (e.g., “bottlenecks”)
- the characteristics of visitors found at various sites in Zion’s proposed wilderness

- visitor evaluations of social conditions (such as numbers of encounters with other visitors)
- changes in visitor use patterns once the Zion Canyon shuttle system is operating

With regard to VERP natural resource data needs, the planning team has identified several natural resource indicators for Zion, as follows:

- number, width, and depth of active social trails in oak woodlands
- streambank profiles in riparian areas
- percent ground cover
- percent microbiotic soils
- vegetation species composition
- soil compaction
- soil bacteria, nematode, and fungi community composition

These indicators are appropriate for Zion because existing staff could take the measurements and the indicators respond rapidly to human disturbance and measure impacts directly related to human disturbance. The VERP implementation plan would propose to implement a monitoring program and standards for some or all of these indicators in different parts of the park

Other indicators and standards for key natural resources may be appropriate in Zion, but additional data are necessary to determine if correlations exist between human activity and resource conditions. These possible indicators include:

- Mexican spotted owl reactions to human activity in nesting areas
- Desert bighorn sheep reactions to human activity in key habitat

- a relationship between visitor river use and Virgin spinedace and aquatic invertebrates
- a relationship between visitor river use and water quality
- Peregrine falcon roosting and nesting activities in relation to climbing and hiking
- mountain lion behavior/activity in visitor use areas
- quality of visitor experience relative to natural and human-generated sound levels
- the tolerance of Zion snails and hanging garden plants to human activity

The National Park Service would develop a wilderness management plan that would address a variety of topics. This implementation plan would:

- describe the existing visitor and administrative facilities in the park's backcountry
- describe the amounts and types of human uses permitted
- identify acceptable limits of resource impacts
- provide guidelines for how the concept of "minimum requirement" would be applied to all administrative decisions that involve the use of otherwise prohibited actions in wilderness
- address other critical wilderness issues, such as reservation systems, human waste, signs, resource monitoring, and fire management

As part of the wilderness management plan, the use of horses in Zion would be analyzed. Expanding the use of horses in some areas and eliminating it elsewhere and allowing horse use only at times when the potential for resource damage or conflicts with other



Recommended Classification of Eligible & Suitable Rivers

- RECREATIONAL RIVER
- SCENIC RIVER
- WILD RIVER
- Ranger station
- Primitive campground
- Picnic area
- Campground
- Unpaved road
- Paved road

Proposed Wild and Scenic Rivers

Zion National Park, Utah
 United States Department of the Interior • National Park Service
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To Cedar City and
Salt Lake City

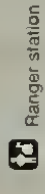
To Cedar City and
Salt Lake City

Recommended Classification of Eligible & Suitable Rivers

RECREATIONAL RIVER

SCENIC RIVER

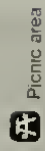
WILD RIVER



Ranger station



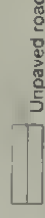
Primitive campground



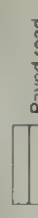
Picnic area



Campground



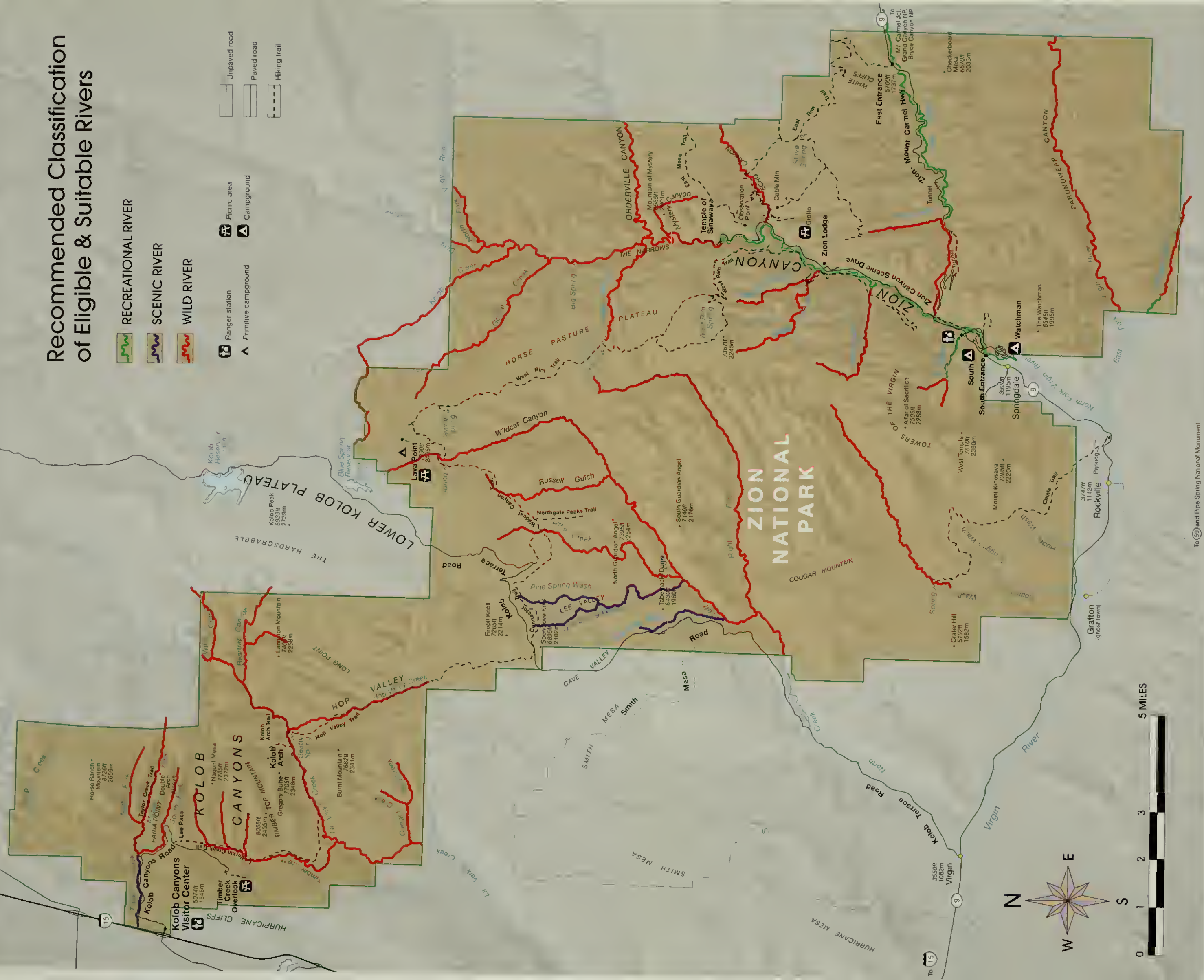
Unpaved road



Paved road



Hiking trail



To (39) and Pipe Spring National Monument

Proposed Wild and Scenic Rivers

Zion National Park, Utah
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visitors is low are some of the actions the plan would evaluate. Other actions include using the services of a volunteer equestrian association to maintain trails and educating members on minimum impact techniques. Regulating the number of horses and type of use (e.g., day trips versus overnight trips) may also be considered.

Decisions regarding locations and levels of climbing/canyoneering in the park would be evaluated as part of a climbing/canyoneering management plan or as a separate planning document (e.g., the wilderness management plan). The plan would describe what activities would be allowed in the park and when, where, and how park managers would oversee the activities. Climbing and canyoneering would be managed under a permit system. Other management actions that may be considered would be similar to those listed above for horse use. The plan also may consider prohibiting or restricting the placement of fixed climbing hardware or other kinds of alterations of rock surfaces, and utilizing the local climbing community and climbing organizations to assist with maintaining or rehabilitating access trails to climbing routes.

The National Park Service also would develop a river management plan(s) that would provide detailed strategies for managing water uses in the park. One plan would address management of the North Fork of the Virgin River. (See the following general strategy on management of the North Fork.)

As noted under “Issues to be Addressed in Future Plans,” a water resources plan that focuses on parkwide water issues would be developed.

As described earlier in this alternative, the Park Service would conduct a water supply, treatment, and conservation study. This study would examine options for conserving and obtaining drinking water in the park.

The Park Service would develop an air tour management plan to provide guidance in managing this activity. The plan would conform to the provisions of the national rule being proposed by the Federal Aviation Administration and the National Park Service and according to proposed congressional legislation. Protection of natural quiet and natural sounds and the provision of opportunities to experience solitude would be the primary objectives of the plan. (See also the “Park Policies and Practices” chapter.)

A noise management plan would address the preservation of natural soundscapes and mitigation of intrusive noise sources. It would describe natural ambient baseline sound conditions, articulate desired sound/noise conditions, and identify approaches for achieving those conditions or mitigating the noise impacts. The plan also would include guidance for managing all noise sources in the park, as well as aircraft flying over the park (excluding air tours).

The Park Service would prepare a commercial services plan to determine the demand for commercial activities in the park. This plan would determine whether or not commercial guided services would be necessary and appropriate as a tool for meeting park objectives (i.e., help provide a diversity of visitor experiences and/or protect park resources).

Additionally, the Park Service would prepare a detailed transportation plan that would determine what conditions would trigger changes in the existing system (e.g., when the shuttle should be expanded to the east side of the park and/or to the Kolob-Terrace Road), the economic feasibility of doing so, and whether the shuttle should be voluntary or mandatory. The plan would also identify locations of support facilities and needed equipment, analyze staffing requirements, examine options for who would operate the shuttles and locations of shuttle stops, look at

other shuttle operational questions (e.g., how frequently shuttles operate), and analyze costs.

A night sky protection plan would identify actions and strategies that can be taken within and outside the park to ensure that artificial light sources did not intrude on visitors' opportunities to view Zion's night sky.

Cost Implications

The planning team prepared general estimates of the costs for the construction of new facilities, the removal of facilities, the rehabilitation/restoration of areas, and other actions. The team also calculated one-time staff costs associated with implementing the alternative (primarily NPS employee costs associated with construction actions and implementation planning) and annual full-time employee costs (primarily associated with operating facilities, and conducting research and monitoring).

Table 2 displays the relative costs of implementing the proposed action in 1999 dollars. Administrative costs, such as design and

compliance costs, are included in the bottom totals. However, the costs of acquiring easements are not identified. Costs also are not included for expanding shuttle systems outside of the Zion Canyon, such as along the Zion-Mt. Carmel Highway. (Park managers would determine these costs in a future transportation plan.) The actual cost of implementing the proposed action would ultimately depend on funding by the National Park Service and Congress over the life of the plan.

The cost figures shown in table 2 (and in the other action alternatives) are only intended to give a very rough idea of the *relative* costs of the proposed action compared to the other alternatives. The estimates are general and should *not* be used for budgeting purposes. Actual costs to the National Park Service will vary depending on if and when the actions are implemented, the size and location of facilities, and contributions by partners and volunteers. Most of the specifics about the size and location of possible developments will be decided in subsequent, more detailed planning and design.

TABLE 2: RELATIVE COSTS FOR MAJOR CAPITAL CONSTRUCTION AND ANNUAL OPERATIONS FOR THE PROPOSED ACTION

| Area and Actions | Capital Costs/ Construction | One-Time Staff Costs (# of FTEs / cost)¹ | Annual Staff Costs (# of FTEs / cost) |
|---|--|--|--|
| Kolob Canyons Area | | | |
| Modify visitor facilities, and add maintenance and administrative offices | \$557,000 | 2 FTE / \$62,000 | 3 FTE / \$135,000 |
| Kolob Terrace Area | | | |
| Build and staff a focused visitor facility/ ranger residence/office on BLM land and remove and rehabilitate the Firepit Knoll area | \$515,000 | 2 FTE / \$87,000 | 3 FTE / \$127,000 |
| Lava Point Area | | | |
| Add visitor facilities and add/replace employee residences | \$368,000 | 4 FTE / \$131,000 | 3 FTE / \$110,000 |
| Main Zion Canyon | | | |
| Restore the North Fork Virgin River (low to high ranges) and build a research facility | \$649,000 - \$1,414,000 | 7 FTE / \$291,000 | 1 FTE / \$78,000 |
| East Entrance & The Zion- Mt. Carmel Highway | | | |
| Build visitor, administrative, and maintenance facilities | \$840,000 | 7 FTE / \$251,000 | 6 FTE / \$243,000 |
| Other General Actions | | | |
| Manage backcountry areas, conduct NPS-guided interpretive trips through Parunuweap, deauthorize current research natural areas and authorize new ones | -- | 2 FTE / \$73,000 | 7 FTE / \$268,000 |
| Implementation Plans: | | | |
| Prepare nine plans and studies (e.g., wilderness, climbing & canyoneering, air tour management, commercial services) | -- | 15 FTEs / \$650,000 | 7 FTE / \$266,000 |
| Total Costs² | \$3,954,000 - \$4,987,000 | 43 FTE / \$1,700,000 | 33 FTE / \$1,350,000 |

Note: This table does not include costs for shuttle systems and easements.

1. FTE = full-time equivalent. One FTE is one person working 40 hours per week.

2. Administrative costs have been added to the total cost and FTE figures.

ALTERNATIVE A: PROVIDE ADDITIONAL OPPORTUNITIES FOR USE AND ACCESS

The emphasis of alternative A is on providing opportunities for more widespread and increased use of Zion, while still protecting resources and providing opportunities for wilderness experiences. Under this alternative, park managers would improve access inside the park by upgrading or building trails; designating new trail routes; and providing additional visitor facilities, including picnic areas, interpretive facilities, and backcountry campsites. As in the proposed action, the management zones would be applied throughout the park, which would limit visitor numbers in certain areas.

GENERAL MANAGEMENT STRATEGIES

In addition to all of the desired conditions and strategies described in the “Park Policies and Practices” chapter, park managers would follow several other management directions and strategies under alternative A. These general management strategies would be the same as those described under the proposed action. That is, park managers would implement the same strategies for both alternatives with regard to general natural resource management, air quality, water supply and conservation, visitor use management, and levels and types of park development. They also would implement the same desired conditions and strategies under both alternatives for operating the Zion Canyon Lodge and managing the North Fork of the Virgin River.

Alternative A differs from the proposed action in that alternative A proposes a different zoning scheme, and park managers would follow different zone-specific management strategies. Different adjustments to the wilderness proposal also would be made.

Natural Resource Mitigation Measures

Under Alternative A, park staff would follow all of the natural resource mitigation measures described earlier under “Park Policies and Practices” and under the proposed action.

ZONE-SPECIFIC MANAGEMENT STRATEGIES

As in the proposed action, under alternative A, the park would be divided into various zones. These zones identify how park managers would manage different areas of the park to achieve desired resource and social conditions and to serve recreational needs. Under alternative A, the same potential management zones would be applied as under the proposed action, but they would be applied in different configurations. (See appendix D for additional details on the zones.)

Zone Allocation and Related Actions

The map for alternative A shows how the park would be zoned. The map shows the zones as both large polygons and as narrow corridors that follow trails, routes, and drainages.

Under this zoning scheme, the Park Service would include about 61% of the park in the primitive zone. The pristine zone would cover the second largest portion of the park (31%), and would include the East Fork of the Virgin River, the area surrounding the three forks of Taylor Creek, the upper part of the Narrows, Orderville Canyon, a large area around the Watchman, several of the canyons north of the Zion-Mt. Carmel Highway, and a large block of land west of Zion Canyon. Like the proposed action, the Park Service would include most of the park’s backcountry in

primitive and pristine zones. The vast majority of these areas are not accessible to most visitors, however, due to the park's steep topography. These zones also would be consistent with most of the park being proposed as wilderness.

About 4% of the park would be zoned as research natural areas, including much of the land on the bottom of Parunuweap Canyon and adjacent canyons, the upper end of Coalpits Wash, Shunes Creek, and several isolated mesa tops and hanging gardens.

The Park Service would designate frontcountry high and low development, transition, and administrative zones in readily accessible areas that are not being proposed as wilderness. Frontcountry low development zones, accounting for about 2% of the park, would be present at the east entrance along the Zion-Mt. Carmel Highway, a large area along the Kolob-Terrace Road, and the Lava Point area. About 0.9% of the park would be in transition zones, including much of the floor of Zion Canyon, the Riverside walk and lower end of the Narrows, Sand Bench, Weeping Rock/Hidden Canyon, Observation Point, and Emerald Pools trails, Middle Fork of Taylor Creek, and the Timber Creek Overlook. Frontcountry high development zones, encompassing about 0.7% of the park, would be located at the south park entrance, in Zion Canyon up to the Temple of Sinawava, along the Zion-Mt. Carmel Highway, and along the Kolob Canyons Road. The administrative zone would cover about 0.2% of the park, primarily in Oak Creek, and near the entrances to Kolob Canyons and Lava Point.

The remainder of this part describes how different areas of the park would be zoned and what actions park staff could take under alternative A. The actions are those the planning team believes will most likely take place over the next 20 years in the park, given the alternative concept, zone definitions, the

conditions that already exist in the park, and the park's environmental constraints. Under this alternative, park staff would construct all of the proposed new facilities in already disturbed areas where possible. Mitigation measures would be applied to avoid sensitive areas such as threatened and endangered species habitat and archeological sites.

Frontcountry Areas

Kolob Canyons Road Area. Under alternative A, the Kolob Canyons Road entrance area would be a frontcountry high development zone. The Kolob visitor center would be expanded and other actions would be taken similar to those of the proposed action to better meet desired conditions. These actions include adding a picnic area and a nature trail.

The Park Service also would designate the entire road corridor to its terminus at the Timber Creek Overlook as a frontcountry high development zone. Under this alternative, park staff would allow visitor traffic on the road to substantially increase, but would not operate a shuttle system. To meet desired frontcountry high development zone conditions for the road corridor, managers would need to take those actions described in the proposed action (e.g., improve trailheads and interpretive facilities along the road). In addition, picnic sites at the Timber Creek Overlook, the Middle Fork of Taylor Creek, and the South Fork of Taylor Creek parking lots would be added. Trailhead parking areas also would be adjusted to meet desired conditions for the trails.

Timber Creek Overlook trail and the trail along the Middle Fork of Taylor Creek would be designated as transition zones. Actions that could be taken to better meet the zone conditions include upgrading the trails and adding interpretive signs.

The area to the north of the entrance would be an administrative zone. Therefore, actions that

could be taken in this zone would be the same as described in the proposed action (e.g., add administrative offices and maintenance facilities).

Kolob-Terrace Road Area. All of this area would be a frontcountry low development zone, including the portion of the Kolob-Terrace Road corridor within the park and most of the large nonwilderness area east and west of the road in the vicinity of Grapevine Wash. If traffic in this area increases in the future, park staff would take action to ensure that a rural experience was maintained (e.g., they would offer a shuttle to transport visitors). Other actions that could be taken to better meet desired zone conditions in this area would be to add picnic sites at the Hop Valley and Wildcat Canyon trailheads and add parking spaces and rest rooms at existing trailheads. Because the zone is much larger in alternative A than the other alternatives, an additional possible action would be to build a bicycle trail paralleling the entire road from the proposed facility on BLM lands near North Creek (see below) to the Lava Point area, and associated parking at existing or new trailheads within the park. (This would require cooperation with the state and possibly some private landowners on road segments that were not within park boundaries.)

As in the proposed action, with the agreement of the Bureau of Land Management, the Park Service would build a focused visitor facility/ranger residence/office and rest rooms on BLM lands near the park boundary at North Creek. The staff at this facility would provide visitors with park information, issue permits, possibly collect fees, and establish a Park Service presence on this side of the park.

Lava Point Area. Most of this area, including the Lava Point campground and picnic area, would be a frontcountry low development zone. The actions that could be taken to better meet the desired conditions in this area would be the same as in the proposed action (e.g.,

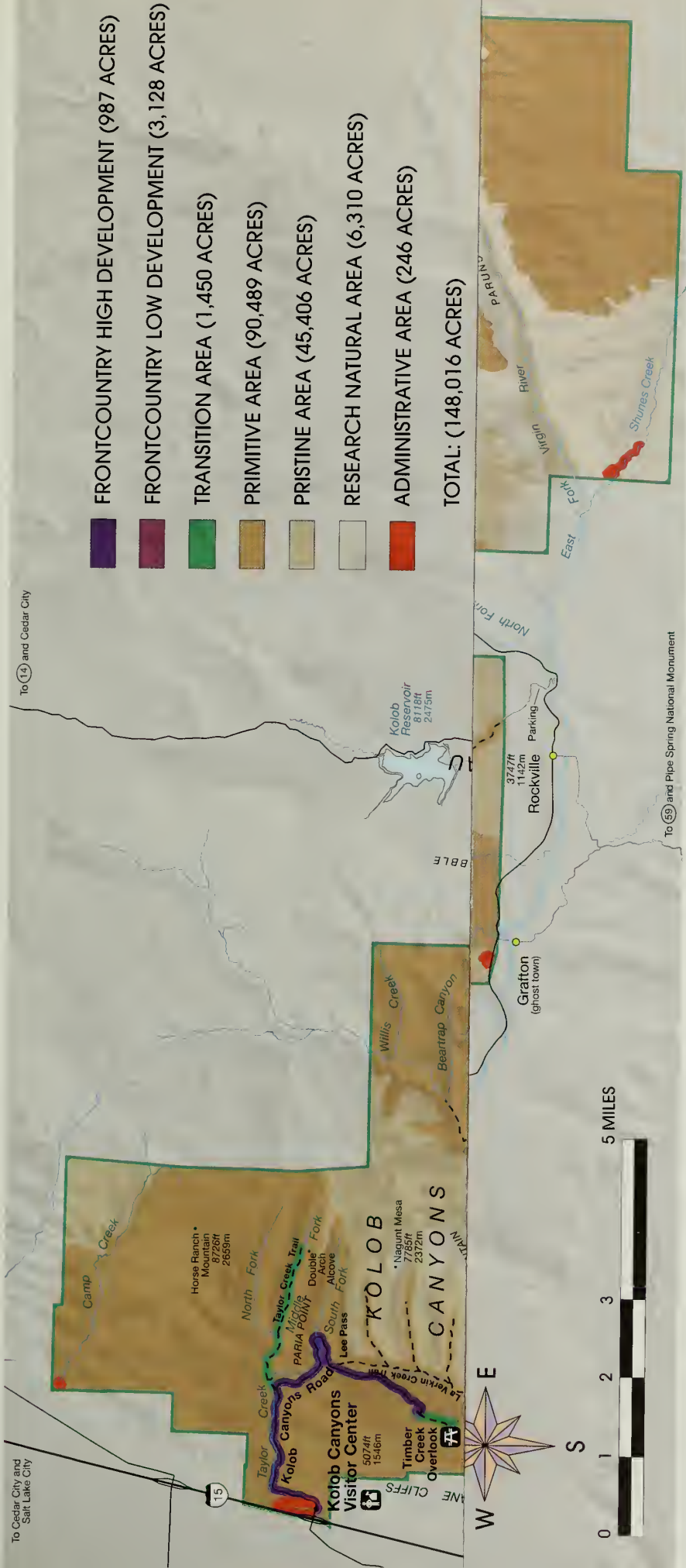
expand the campground, add new picnic sites, build interpretive facilities). Also, if visitor numbers increase in this area, park managers would take action to ensure that the opportunity to experience a rural environment is maintained, such as by limiting the number of private vehicles or offering a shuttle to transport visitors.

Unlike the proposed action, in alternative A, the roads leading east of Lava Point onto private land outside of the park also would be frontcountry low development zones. To meet the desired zone conditions of allowing public access in a fairly structured rural environment, the roads east of the existing gate (at the West Rim trailhead) would be opened to public motorized use.

Like the proposed action, the area to the north of the entrance would be an administrative zone, which would support the management of this part of the park. The existing ranger residence at Lava Point would be replaced with a new residence and the Firepit Knoll facility would be demolished.

South Entrance and the Main Zion Canyon Area. Under alternative A, the Park Service would apply a mix of frontcountry high development, transition, and administrative zones to this part of the park. The location of the zones and the associated necessary or allowable actions generally would be the same as in the proposed action. However, in alternative A, all of Hidden Canyon (including the route through the canyon) would be in a transition zone.

East Entrance and the Zion-Mt. Carmel Highway Area. The road corridor and east entrance area would be frontcountry high development zones. Even though there would be a slightly wider corridor of frontcountry high development compared to the proposed action, the actions that could be taken would be the same as those described in the proposed



This zoning map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners.

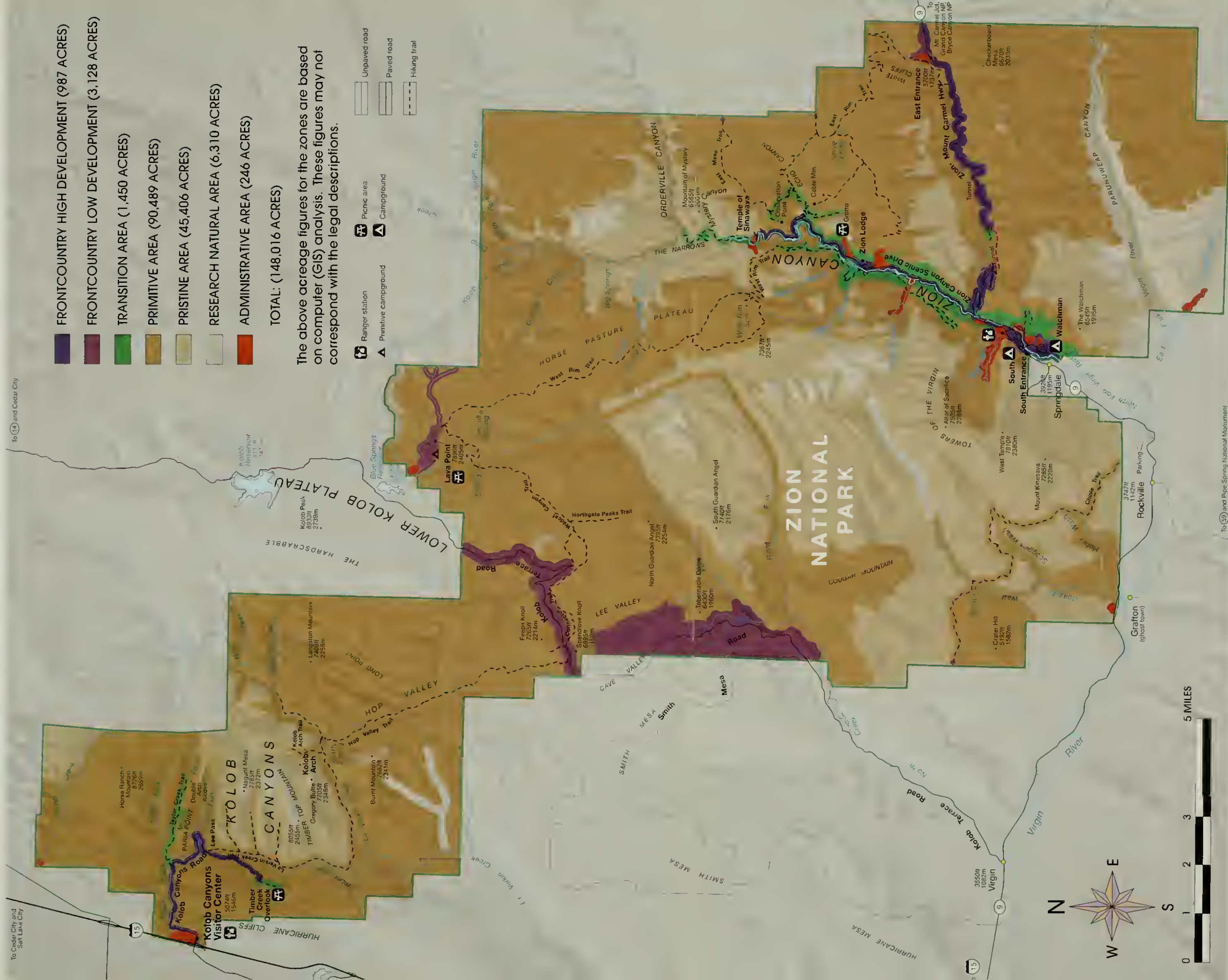
Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

Alternative A

Zion National Park, Utah

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This zoning map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners.

Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

Alternative A

Zion National Park, Utah

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action (e.g., provide interpretive facilities and a voluntary shuttle).

As in the proposed action, the short access road to the East Rim trailhead and a large area north of the east entrance would be frontcountry low development zones. Actions that could be taken to help this area better meet desired zone conditions would be the same described for the proposed action (e.g., build new interpretive facilities, picnic areas, and parking lots).

The Canyon Overlook trail would be a transition zone. The actions that could be taken to better meet the zone conditions would be the same as those described in the proposed action (e.g., upgrade the trail, add more interpretive signs).

The existing administrative area at the east entrance would be an administrative zone. The actions that could be taken in this area would be the same as those described in the proposed action (e.g., add administrative or maintenance facilities).

Other Frontcountry and Administrative Areas. Just outside the proposed wilderness, two areas on the park's east boundary and one area on the west boundary would be frontcountry low development zones. On the east boundary, trailheads and parking areas would be developed to improve visitor access to the East Mesa and East Rim trails. Likewise, on the west boundary, a trailhead and parking area would be built to improve access to Dalton Wash. These actions would also eliminate the need for visitors to park their vehicles on private or BLM land outside of the park.

The Park Service would designate two administrative zones, one covering about a quarter of a mile at the mouth of Camp Creek and the other covering about three-quarters of a mile along Shunes Creek. These areas have

private water rights and are regulated to facilitate use by the water right owners.

Proposed Wilderness

The Park Service would propose a total of 137,347 acres (93% of the park) for wilderness designation under alternative A (see the Wilderness — Alternative A map). Like in all of the alternatives, the Park Service would modify the 1974 wilderness proposal to reflect acquisitions of several inholdings and make the wilderness boundaries easier to identify on the ground. In addition, the Park Service would make several changes to ensure that the zones in alternative A and the wilderness boundaries were congruent.

The wilderness proposal would include all areas of the park zoned as pristine, primitive, or research natural areas except for two areas: (1) the area north and south of the Smith Mesa Road confined by the Kolob-Terrace Road and the park boundary, and (2) the area south of the powerline corridor in the Coalpits area. Like the proposed action, a spur road near Lava Point would be added to the proposed wilderness since it has not been used for motorized access in recent years and is returning to its natural state. Because the transition zone is incompatible with proposed wilderness designation, the park managers would no longer include the following trail sections in the proposed wilderness boundary:

- the Timber Creek Overlook trail
- the Middle Fork of Taylor Creek
- a segment of the Narrows from a quarter mile below Orderville Canyon up to the actual junction with Orderville Canyon
- the Observation Point trail
- Hidden Canyon
- the last half mile of the Watchman trail

- two miles of the Sand Bench trail
- and the quarter-mile Upper Emerald Pools trail

In addition, the Park Service would remove the land zoned frontcountry low development for the East Rim, East Mesa, and Dalton Wash parking lots and trailheads from the proposed 1974 wilderness boundary.

Primitive Zones. The Park Service would apply the primitive zone to 86,569 acres in the proposed wilderness, which would include several trails and routes. As in the proposed action, managers likely would need to take action to meet desired zone conditions and limit the current or future numbers of visitors on the Narrows route from the northern park boundary to the junction with Orderville Canyon. Managers may need to place limits on future visitor use elsewhere in the primitive zones, if visitor use levels increased to the point that desired conditions were not being met.

To better meet conditions within the primitive zone, park managers could improve visitor access by adding some trails or clearly delineated routes in areas that were able to withstand increased human use (e.g., in areas where there are no spotted owls or other concerns regarding resources). There would be a greater potential for adding trails or routes in this alternative compared to the proposed action because more of the park would be zoned primitive as opposed to pristine. The topography in this area would be most conducive to improving access by:

- upgrading existing trails and routes to Dalton Wash, the area adjacent to Lava Point, Horse Pasture Plateau, and the three fingers of Timber Creek
- constructing additional narrow, unsurfaced trails or new routes in the above areas and in the Horse Ranch Mountain, Langston Mountain, Pine Spring, and Cougar Mountain areas

Management Zone Visitor Use Limits

Visitor use limits generally would not be imposed in the frontcountry high and low development zones and the transition zone, unless required by facility design capacities or to protect resources. The primitive, pristine, and research natural area zone conditions would limit the number of people that could enter these areas.

In the **primitive** zone, group sizes for day and overnight use would be limited to eight or fewer individuals (in horse parties, the total number of people and horses combined would not exceed eight). No more than 12 groups generally would be encountered per day in the zone.

In the **pristine** zone, the size of groups would be limited to no more than five people. Visitors would usually not expect to encounter other groups in the zone.

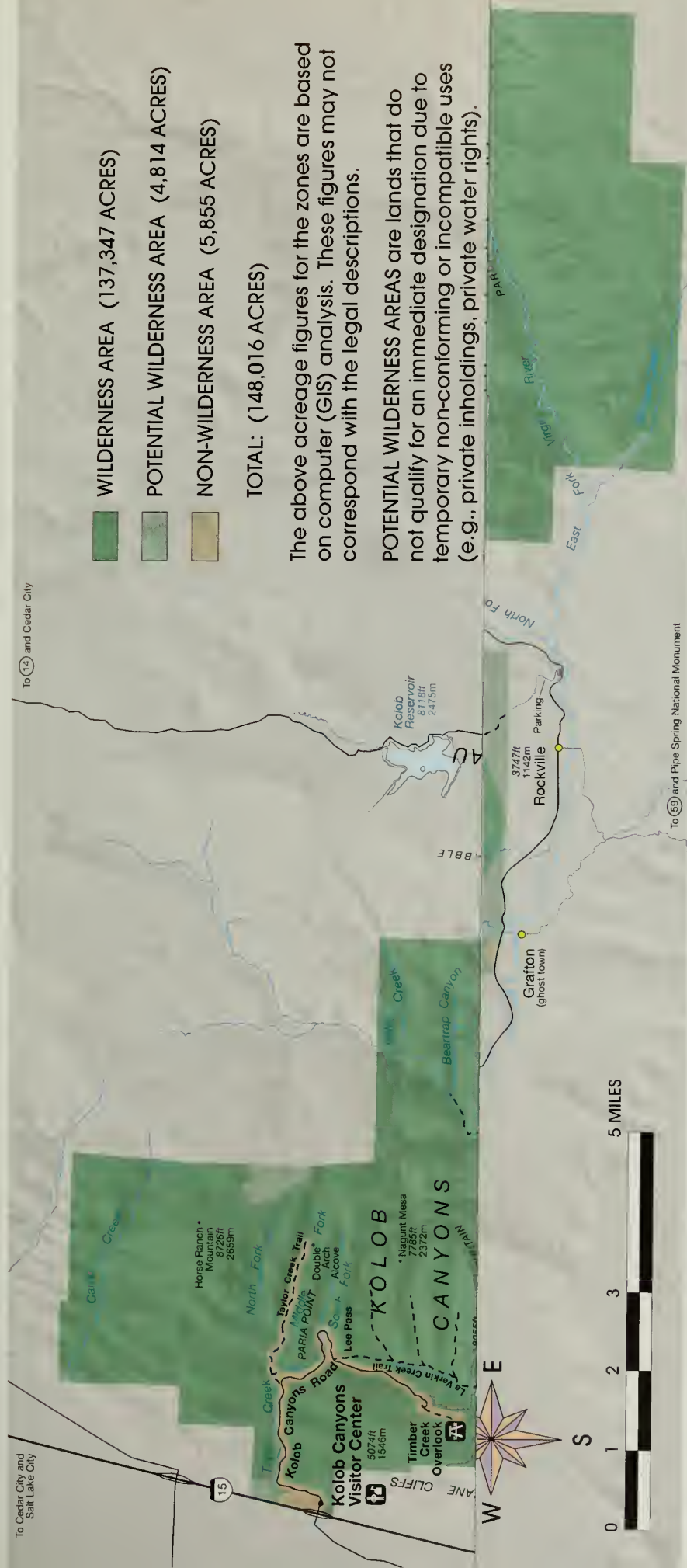
In the **research natural area** zone, authorized research and guided educational group sizes would be limited to no more than eight people. Recreational use would not be permitted in these areas.

- adding narrow unsurfaced trails in some of the lower reaches of the side canyons on either side of the Zion-Mt. Carmel Highway. (Unlike the proposed action, the Zion-Mt. Carmel Highway trails in alternative A could extend farther up the canyons because more of the area would be zoned primitive as opposed to pristine.

Designated campsites also could be established in the primitive zone, albeit outside of sensitive resource areas. The number of potential new campsites would be greater in this alternative than under the proposed action due to the greater portion of the park that would be in primitive zones.

Unlike the proposed action, in alternative A the existing Firepit Knoll administrative area and its associated access road would be primitive zones.

As with other primitive areas, if visitor use in this area increases to the point that the desired zone conditions are not met, park managers



This map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners. Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

Wilderness - Alternative A

Zion National Park, Utah

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To Cedar City and
Salt Lake City

To Cedar City and
Salt Lake City

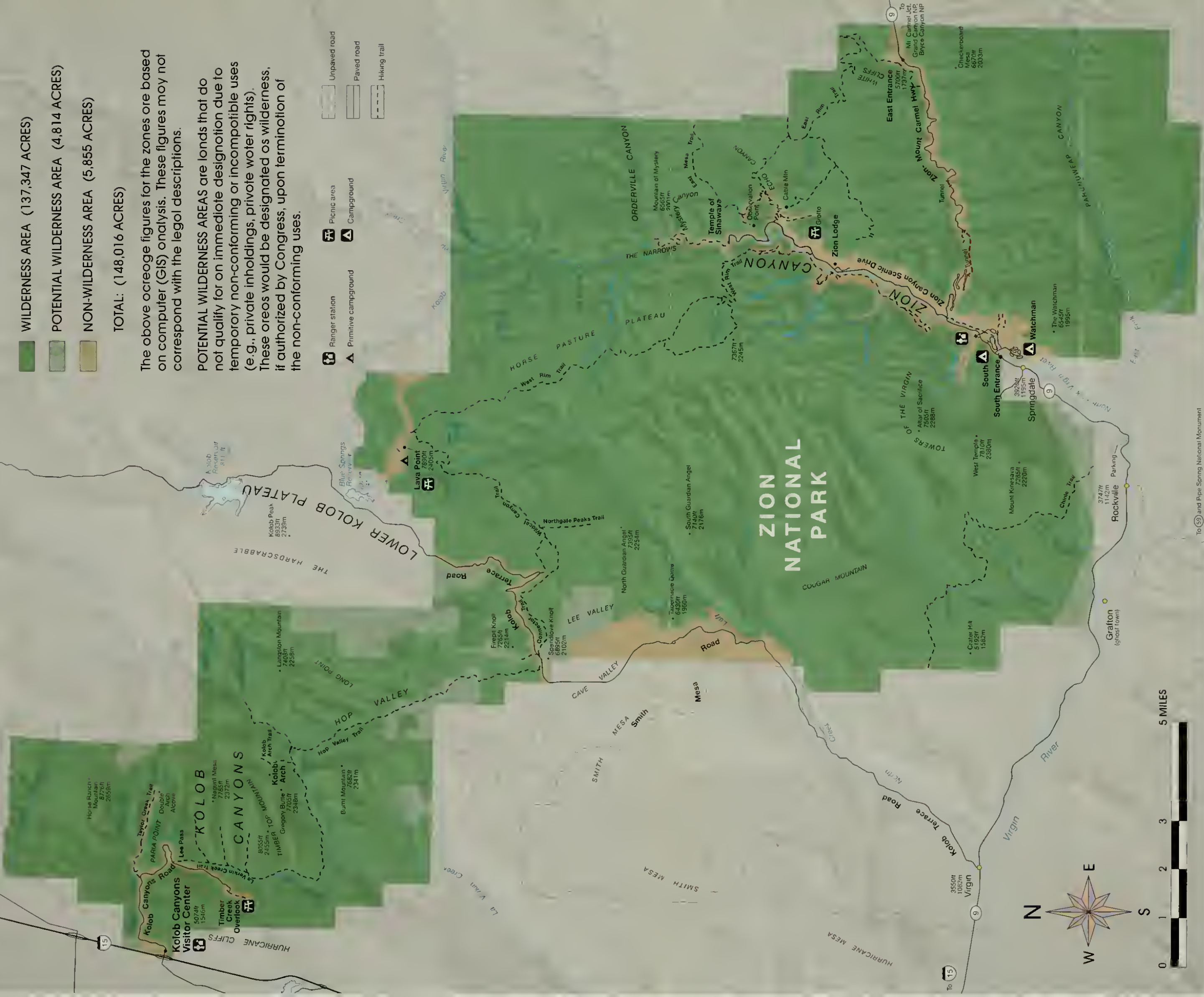
- WILDERNESS AREA (137,347 ACRES)
- POTENTIAL WILDERNESS AREA (4,814 ACRES)
- NON-WILDERNESS AREA (5,855 ACRES)

TOTAL: (148,016 ACRES)

The above acreage figures for the zones are based on computer (GIS) analysis. These figures may not correspond with the legal descriptions.

POTENTIAL WILDERNESS AREAS are lands that do not qualify for an immediate designation due to temporary non-conforming or incompatible uses (e.g., private inholdings, private water rights). These areas would be designated as wilderness, if authorized by Congress, upon termination of the non-conforming uses.

- Ranger station
- Picnic area
- Unpaved road
- Primitive campground
- Campground
- Paved road
- Hiking trail



To 59 and Pipe Spring National Monument

This map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners. Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

Wilderness - Alternative A

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would need to reduce use. They also would need to provide new opportunities in this area for visitors to experience wildlands and solitude in a largely undisturbed landscape. To achieve this condition, the Firepit Knoll road and ranger residence would be removed and the area restored to natural conditions when nearby inholdings were acquired. (Park managers would make decisions about horseback riding at a later date, as part of the wilderness management plan.)

Pristine Zones. The Park Service would apply the pristine zone to 44,515 acres in the proposed wilderness, which would include several known routes. In general, existing conditions meet the undeveloped, very low use nature of this zone. However, to ensure that visitors encounter very few if any other groups in the Mystery Canyon route, managers would need to limit visitor numbers now or in the future (currently the route receives low to moderate use). In the future, managers may need to place limits on visitor use elsewhere in the pristine zones, as well, if visitor use levels increased to the point that desired conditions were not being met. Other actions that could be taken in the pristine zone would be the same as described in the proposed action (e.g., remove signs of human evidence and restore natural conditions in areas where necessary, as determined by park managers).

Under alternative A, a corridor along the Parunuweap Canyon following the river floodplain up to Labyrinth Falls would be a pristine zone. Park managers would open this corridor to limited numbers of NPS or NPS-sanctioned guided interpretive trips. Visitors would have access to this area under the same conditions as those described under the proposed action.

Research Natural Areas

The Park Service would apply the research natural area zone to 6,263 acres in the proposed wilderness. These areas would be ones the Park Service believes were more suitable than those currently designated as research natural areas, and which could be managed more consistently with the intent of the research natural area national network. The research natural areas in alternative A would include a section of the existing Coalpits route (upper Coalpits Wash), most of Parunuweap Canyon (except for the river corridor included as a pristine zone, as noted above), the Shunesburg Mountain area, some isolated mesatops (e.g., Timber Top, Gregory Butte, Burnt Mountain, Greatheart Mesa), selected hanging gardens in Parunuweap, the Grotto, Weeping Rock, and North Menu Falls, and riparian corridors (Shunes, Cane and Current Creeks). To meet desired zone conditions, managers would close these areas to public use, with the exception of specially authorized guided educational trips. Other actions that park managers could take would be the same as those described for the proposed action.

PROPOSED BOUNDARY ADJUSTMENTS

Under alternative A, the Park Service would propose the same boundary adjustments as the proposed action. The Park Service would propose a total of five land transfers with the Bureau of Land Management (totaling approximately 950 acres), nine access easements (totaling approximately 15 miles in length), and three conservation easements (totaling approximately 2,220 acres) under alternative A.

PROPOSALS FOR WILD, SCENIC, AND RECREATIONAL RIVER DESIGNATION

Alternative A would propose the same drainages for inclusion in the national wild and scenic river system as the proposed action: the North Fork of the Virgin River above and below the Temple of Sinawava, the East Fork of the Virgin River, North Creek, La Verkin Creek, and Taylor Creek, and their tributaries. (See table 1 for the proposed classifications.)

IMPLEMENTATION

Priorities and Funding

Like the proposed action, the Park Service would implement actions under alternative A over the next 15 to 20 years as funding becomes available. Park managers could establish partnerships with other agencies or groups to implement several of these actions, and would need to increase and reallocate staff within park programs to support the implementation of this alternative. Project priority would be based on the criteria listed under the proposed action.

Under alternative A, the Park Service also would prepare all of the “step-down” implementation plans and studies described under the proposed action (e.g., a VERP implementation plan, wilderness management

plan, climbing/canyoneering management plan, river management plan, commercial services plan). The Park Service would seek public input in the preparation of all of these plans and prepare additional environmental documentation as needed to comply with the National Environmental Policy Act.

Cost Implications

Table 3 displays the relative costs of implementing alternative A in 1999 dollars. The table shows general estimates of the costs for constructing new facilities, removing facilities, rehabilitating/restoring areas, and conducting other actions under alternative A. The table also displays one-time costs associated with implementing the alternative (primarily NPS employee costs associated with construction actions and implementation planning) and annual full-time employee costs (primarily associated with operating facilities and conducting research and monitoring). However, the table does not identify the costs of acquiring easements or include costs for expanding shuttle systems outside of the Zion Canyon, such as along the Zion-Mt. Carmel Highway. (The Park Service would determine these costs in a future transportation plan.)

The cost figures are only intended to give a very rough idea of the relative costs of alternative A compared to the other alternatives. All of the caveats regarding the cost figures described under the proposed action also apply to alternative A.

TABLE 3: RELATIVE COSTS FOR MAJOR CAPITAL CONSTRUCTION AND ANNUAL OPERATIONS FOR ALTERNATIVE A

| Area and Actions | Capital Costs/ Construction | One-Time Staff Costs (# of FTEs / cost) ¹ | Annual Staff Costs (# of FTEs / cost) |
|---|--------------------------------|---|--|
| Kolob Canyons Area | | | |
| Modify visitor facilities, and add maintenance and administrative offices | \$763,000 | 2 FTE / \$80,000 | 4 FTE / \$182,000 |
| Kolob Terrace Area | | | |
| Build a focused visitor facility/ ranger residence/office on BLM land, visitor facilities (e.g., bicycle trail), and remove and rehabilitate the Firepit Knoll area | \$2,926,000 | 6 FTE / \$229,000 | 4 FTE / \$155,000 |
| Lava Point Area | | | |
| Add visitor facilities and add/replace employee residences | \$368,000 | 4 FTE / \$131,000 | 2 FTE / \$75,000 |
| Main Zion Canyon | | | |
| Restore the North Fork Virgin River (low to high ranges) and build a research facility | \$649,000 - \$1,414,000 | 7 FTE / \$291,000 | 1 FTE / \$78,000 |
| East Entrance & The Zion-Mt. Carmel Highway | | | |
| Build visitor, administrative, and maintenance facilities | \$840,000 | 7 FTE / \$251,000 | 6 FTE / \$238,000 |
| Other General Actions | | | |
| Manage backcountry areas, conduct NPS-guided interpretive trips through Parunuweap, deauthorize current research natural areas and authorize new ones | -- | 2 FTE / \$73,000 | 8 FTE / \$335,000 |
| Implementation Plans | | | |
| Prepare nine plans and studies (e.g., wilderness, climbing and canyoneering, air tour management, commercial services) | -- | 15 FTE / \$650,000 | 7 FTE / \$266,000 |
| Total Costs² | \$7,487,000 – 8,520,000 | 38 FTE / \$1,876,000 | 24 FTE / \$1,462,000 |

Note: The table does not include costs for shuttle systems and easements.

1. FTE = full-time equivalent. One FTE is one person working 40 hours per week.

2. Administrative costs have been added to the total cost figures.

ALTERNATIVE B: RESOURCE PROTECTION EMPHASIS

The emphasis of alternative B is on providing increased protection for park resources while still providing a range of visitor experiences. To protect park resources, strict limits would be imposed on the use of several trails and routes, and recreational use would be prohibited in several areas. There would be minimal new development in the park. As in the proposed action, management zones would be applied throughout the park, which would limit visitor numbers in more areas. (This alternative incorporates concepts from alternatives C and D in the October 1997 “Alternatives Workbook.”)

Alternative B and the proposed action differ primarily in the zoning scheme and zone-specific actions that would be taken. The two alternatives also differ with regard to the strategy for operating the shuttle system, the desired conditions and strategies for the Zion Canyon Lodge, and the adjustments to the wilderness proposal.

GENERAL MANAGEMENT STRATEGIES

Natural Resource Mitigation Measures

Under alternative B, the Park Service would follow all of the natural resource mitigation measures described earlier under “Park Policies and Practices” and under the proposed action.

In addition to the desired conditions and strategies described in the “Park Policies and Practices” chapter, the Park Service would follow several other management directions and strategies under alternative B. Most of these general management strategies are the same as those described under the proposed action. These strategies include the general management and natural resource management strategies, as well as the

strategies for managing water quantity and quality, visitor use, and levels and types of park development.

Management of the North Fork of the Virgin River

In general, under alternative B, park managers would implement the same desired conditions and strategies described in the proposed action for managing the North Fork of the Virgin River. Although most of the river would be a primitive zone in the main Zion Canyon, this zoning would not affect the river restoration effort. (The gabions and riprap along the river are inconsistent with the primitive zone conditions, but in this case, some artificial structures may be retained to protect the road and other facilities in the canyon.) Also under alternative B, all water collection structures at the springs would be removed.

Zion Canyon Lodge

Zion Canyon Lodge, currently owned by the National Park Service, has historically provided food and lodging to park visitors in a spectacular setting. Some believe it is not an appropriate facility in the park and that its services are duplicated outside of the park. Under alternative B, the Park Service, would change the lodge facilities to meet specific visitor education and park research needs, rather than provide food service and lodging to the general visiting public. The lodge facilities would be an environmental education center offering for a variety of programs, much like the Grand Canyon Institute or the Yosemite Institute. It would provide opportunities to enhance science-based education for the visiting public through seminars, workshops, residential camps and similar programs. An essential element of this

facility would be a center to support NPS, academic, and professional research in the cultural, natural, and social sciences. The planning team anticipates that under this alternative, private enterprises outside the park in nearby communities would meet lodging and food service needs.

- *Desired Condition:* An internationally renowned, state-of-the-art facility supports research and science-based education through elementary, secondary and adult programs. With this facility, the public is actively engaged in the study of park natural, cultural, and recreational resources and park management.
- *Strategies:* The Park Service would convert Zion Lodge facilities to a science education center with an associated research station. The lodge would retain kitchen, dining, and lodging facilities to the extent necessary to support seminars, workshops, residential camps, and domiciled scientists. Existing structures would also house classrooms, conference meeting rooms, and research and teaching laboratories, as well as storage and maintenance space. The Park Service would develop agreements to locate park-based, university research field stations at the lodge facilities. Support for the facility would be developed through a combination of private donations, donations to a newly established Zion-based nonprofit organization, fees associated with locating university field stations at Zion, and federal funds, as necessary. The Park Service would emphasize the establishment of a nonprofit organization that would operate and maintain the facility under agreement with the National Park Service.

ZONE-SPECIFIC MANAGEMENT STRATEGIES

Like the proposed action, the Park Service would divide the park into various zones that identify how to manage different areas of the park to achieve desired resource and social conditions and to serve recreational needs. The same potential management zones described under the proposed action would be applied in alternative B. (See appendix D for additional details on the zones.)

Zone Allocation and Related Actions

The map for alternative B shows the park zones, both as large polygons and as narrow corridors that follow trails, routes, and drainages.

In alternative B, the Park Service would include most of Zion in pristine and research natural area zones. The pristine zone would be the largest zone, covering about 80% of the park. About 14% of the park would be research natural areas, including the southeast corner of the park, all of Parunuweap Canyon, most of Shunes Creek, Gifford Canyon, the Right Fork of North Creek, Beartrap Canyon, Willis Creek, lower La Verkin Creek south of the La Verkin Creek trail, Dalton Wash, and several hanging gardens and isolated mesa tops. Although little use would occur in these zones, the majority of these areas are not accessible to most visitors due to the park's steep topography. These zones also would be consistent with most of the park being proposed as wilderness.

Primitive areas would cover approximately 5% of the park, including much of the floor of Zion Canyon, a large area around Lava Point, the Narrows from the north park boundary down to Mystery Canyon, the Left Fork of North Creek, much of the West Rim trail, the upper ends of the East Mesa and East Rim

trails, Hidden Canyon, and Cable Mountain and Deertrap Mountain trails.

Like the previous two alternatives, front-country high and low development zones, as well as transition, and administrative zones, would be in areas that the public can readily access and outside of the proposed wilderness area. The Park Service would designate about 0.6% of the park as frontcountry low development zones, including the area along the Zion-Mt. Carmel Highway, the Zion Canyon Scenic Drive, the Kolob-Terrace Road, Lava Point, and the Kolob Canyons Road. Frontcountry high development zones would cover about 0.2% of the park and would include the south park entrance, the Zion Lodge area, the east park entrance, and the Kolob Canyons entrance. Another 0.1% of the park would be transitional zones, including the Canyon Overlook trail, the Hidden Canyon trail up to the mouth of the canyon, the road from the Zion Lodge to the Temple of Sinawava, the Riverside walk trail up to Mystery Canyon, and the road from Lava Point ranger residence to the West Rim trailhead. The administrative zone would also comprise about 0.1% of the park.

The remainder of this part describes how the Park Service would zone different areas of the park and the actions that could occur under alternative B. The actions are those the planning team believes would most likely occur over the next 20 years in the park, given the management alternative concept, zone definitions, and the park's existing conditions and environmental constraints. All of the proposed new facilities would be built in already disturbed areas where possible. Mitigation measures would also be taken to avoid sensitive areas, such as threatened and endangered species habitat and archeological sites.

Frontcountry Areas

Kolob Canyons Road Area. Under alternative B, the entrance area would be a front-country high development zone.

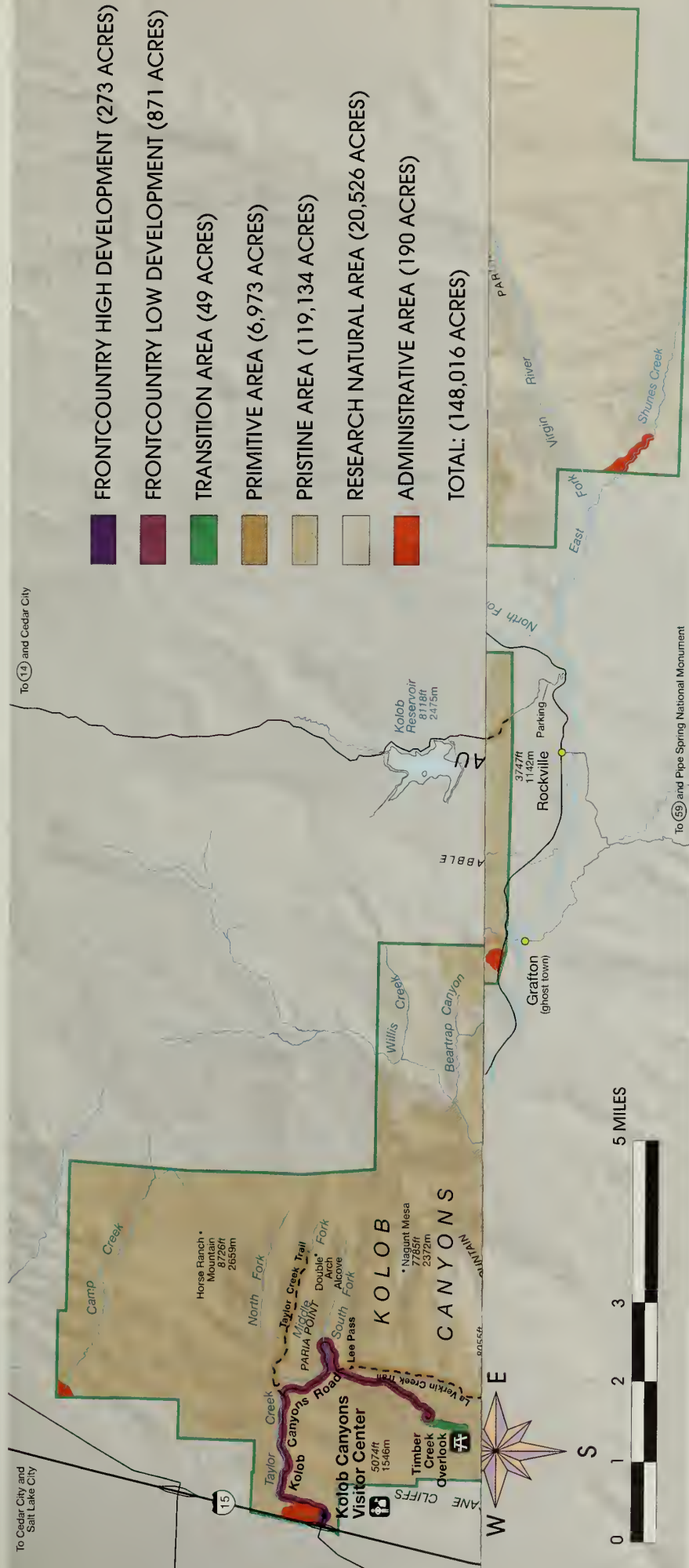
However, in keeping with the philosophy of this alternative, the Park Service would only provide a few new developments (e.g., adding a picnic area and/or a nature trail).

The Kolob Canyons Road itself (the road corridor from the entrance gate to the Timber Creek Overlook trailhead) would be a front-country low development zone. The actions that could be taken to better meet zone conditions would be the same as in the proposed action (e.g., limit traffic, run shuttles, improve trailheads and interpretive facilities along the road), with one exception — the existing parking lot for the South Fork of Taylor Creek would be removed in alternative B. (This action would be taken because the area would be a pristine zone, which would limit use.)

The Timber Creek Overlook trail would be a transition zone. Actions that could be taken to better meet the zone conditions include up-grading the trail and adding interpretive signs.

The area to the north of the entrance would be an administrative zone. The actions taken in this zone would be the same as described in the proposed action (e.g., add administrative offices and maintenance facilities).

Kolob-Terrace Road Area. Under alternative B, the portion of the Kolob-Terrace Road corridor within the park would be a front-country low development zone. Thus, actions that could be taken to better meet zone conditions would be the same as in the proposed action, except that parking at the former Right Fork and Wildcat Canyon trailheads would be removed. (Both the Right Fork route and the Wildcat Canyon trail would be removed due to zoning the areas as a research natural area and a pristine area, respectively.) Trailheads for the Grapevine and Hop Valley trails also



This zoning map shows how inholdings within Zion National Park would be managed if they are acquired in the future. Until the inholdings are acquired, the National Park Service recognizes that these are private lands and it respects the rights of the landowners.

Private vehicle access to the inholdings on existing roads would be permitted regardless of the desired conditions (zones) in the alternatives unless the inholdings and associated roads are acquired.

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would be removed because these trails would be pristine zones.

Lava Point Area. The Park Service would apply the frontcountry low development zone to the entrance area, the road accessing the campground and picnic area, and the campground and picnic areas. New picnic sites could be added here to help better meet the desired zone conditions. However, in keeping with the philosophy of alternative B, little or no other new development would occur.

The road from the ranger residence to the West Rim trailhead would be a transition zone. To meet desired conditions, the road by the ranger residence would be gated and closed to access by the motorized public beyond that point. (Park staff and owners and guests of the private property to which the roads lead would be allowed to use motor vehicles, as per the special exemptions described for the normally nonmotorized transition zone.) In addition, the West Rim trailhead to the Lava Point ranger residence would need to be relocated.

As in the proposed action, the road east of the gate at the West Rim trailhead, including all three forks leading onto private land outside of the park, would be an administrative zone. This would allow continued motorized access by administrative vehicles and the private landowners and their guests. An area north of the entrance also would be an administrative zone to support management of this part of the park. The existing ranger residence here would be replaced with a new residence and the Firepit Knoll facility would be completely removed.

South Entrance and the Main Zion Canyon Area. The Park Service would apply a mix of frontcountry high development, frontcountry low development, transition, and administrative zones to this part of the park.

The areas zoned frontcountry high development would include the following areas:

- the road corridor from the south entrance to junction with the main Zion Canyon road
- most of the south entrance area itself, including the campgrounds, the new visitor center/shuttle staging site, and the segments of the Pa'rus trail and the North Fork of the Virgin River running through the campgrounds
- most of the Zion Canyon Lodge area, including the parking areas, lodging facilities, and restrooms

Adding a picnic site in disturbed areas is one action that could better meet zone conditions.

The Park Service would apply the frontcountry low development zone to the main Zion Canyon road corridor from its junction with the Zion-Mt. Carmel Highway to its terminus at the Temple of Sinawava. To reduce resource impacts and improve the quality of the visitor experience along this segment of the road as well as in the Narrows, the number and frequency of shuttles going to the Narrows would be lowered in this alternative compared to the other alternatives.

The Park Service would apply the transition zone to the Grotto and the canyon bottom east of the road corridor, and to a small area across from the Zion Canyon Lodge that includes the North Fork of the Virgin River. Several trails also would be transition zones, including: the segment of the Pa'rus trail extending north of the campgrounds; the lower, middle, and upper Emerald Pools trails; a segment of the West Rim trail; the trail to Angel's Landing; the Hidden Canyon trail to the mouth of the canyon; and the Riverside Walk trail up to the junction with Mystery Canyon. No actions would be necessary to meet zone conditions in these areas.

Several areas would be administrative zones, including Sammy's Canyon (site of the shuttle maintenance facilities), the Watchman employee housing area, the old waste treatment plant, the existing visitor center/headquarters, a portion of the existing Oak Creek employee housing and maintenance area, the Pine Creek housing area, the Birch Creek employee housing area, and concessions' support facilities around the Zion Canyon Lodge. Although these areas would be slightly different zones than in the proposed action, no additional actions would be necessary at this time beyond what is discussed in the no-action alternative (e.g., building the new shuttle maintenance facility at Sammy's Canyon). Any future development would be carried out in a manner consistent with the zone descriptions.

East Entrance and the Zion-Mt. Carmel Highway Area. An area north of the east entrance would be a frontcountry high development zone. If the Park Service could not locate a site outside the park boundary, this area would be used for a new full-service visitor center with shuttle staging, parking, and restrooms. The facility would be necessary to support a mandatory shuttle system along the Zion-Mount Carmel Highway.

The road corridor (100 feet either side of the centerline) and the short access road to the East Rim trailhead would be frontcountry low development zones. To meet the conditions of this zone, managers would need to significantly reduce vehicle traffic to levels resembling a more rural experience. The most reasonable way this could be achieved would be to implement a mandatory visitor shuttle system between the south and east entrances. (Nonrecreational commuter traffic — those who live on one side of the park and are merely passing through — would still be allowed to use the highway.) The Park Service would need to purchase new shuttle vehicles since the ones to be used in the main Zion

Canyon cannot drive up the grades on the Zion-Mt. Carmel Highway.

With the mandatory shuttle, several other actions would be necessary. Since all of the pullouts along the road would no longer be needed, they would be removed and the areas rehabilitated. The parking areas along the road also would be redesigned as shuttle stops and several social trails would be rehabilitated. In addition, the new visitor center and staging area at the south entrance may need to be expanded to provide for shuttles going both to the main Zion Canyon and the east entrance.

Park managers could take other actions to better meet the conditions of the frontcountry low development zone, such as to provide short nature trails at the east entrance and picnic sites along the road. However, the number of possible picnic sites would be limited to a total of ten along the whole road, as per the definition of a frontcountry low development zone.

The Canyon Overlook trail would be a transition zone. Therefore, the actions that could be taken to better meet the zone conditions would be the same as described in the proposed action (e.g., upgrade the trail, add more interpretive signs).

Other Frontcountry and Administrative Areas. Two areas would be zoned as frontcountry low development. Park staff would develop trailhead and parking areas at the East Mesa and East Rim trails on the park's eastern boundary to improve visitor access to these areas and eliminate the need for visitors to park on private land outside of the park.

The Park Service would designate two administrative zones, one covering about a quarter of a mile at the mouth of Camp Creek and the other covering about three-quarters of a mile along Shunes Creek. These areas have private water rights; the Park Service would regulate

them to facilitate use by the water right owners.

Proposed Wilderness

The Park Service would propose a total of 141,029 acres (95% of the park) for wilderness designation under alternative B (see the Wilderness — Alternative B map). As in the previous alternatives, in alternative B, the 1974 wilderness proposal would be modified to reflect acquisitions of several inholdings and to make the wilderness boundaries easier to identify on the ground. Several other changes in the proposed wilderness boundaries would be made to ensure that the zones and the wilderness boundaries were congruent.

The alternative B wilderness proposal would include all areas of the park zoned as pristine, primitive, or research natural areas except for two areas: (1) the area north and south of the Smith Mesa Road, confined by the Kolob-Terrace Road and the park boundary, and (2) the area south of the powerline corridor in the Coalpits area. As in the proposed action, a spur road near Lava Point would be added to the proposed wilderness area, since it had not been used for motorized access in recent years and the roadbed is returning to its natural state. As in the proposed action and alternative A, the areas of the East Rim and East Mesa parking lots and trailheads that are frontcountry low development zones would be removed from the proposed wilderness boundary. In addition, the Park Service would expand the proposed wilderness boundary to include the entire Sand Bench trail in the main Zion Canyon, the entire Watchman trail, the Narrows from Mystery Canyon north to the park boundary, and a part of the Oak Creek maintenance area.

Primitive Zones. The Park Service would apply the primitive zone to 6,900 acres in the proposed wilderness, primarily just along

existing trails and routes. To meet desired zone conditions, park managers would need to limit current or future levels of visitor use on the following trails and routes: the Narrows from the northern park boundary to the junction with Mystery Canyon, the section of the Observation Point trail that is a primitive zone, the route up through Hidden Canyon, upper Emerald Pools trail, the Middle Fork of Taylor Creek, La Verkin Creek trail, Watchman trail, and Sand Bench trail. In addition, visitor numbers would need to be limited in the Lava Point area, and the existing concession horse operation on the Sand Bench trail may need to be eliminated, because this type of use would not be consistent with the primitive zone conditions. In the future, managers may need to place limits on visitor use elsewhere in the primitive zones, if visitor use levels increased to the point that desired conditions are not being met.

To better meet conditions within the primitive zones, visitor access could be improved by adding some trails or clearly delineated routes in areas that were able to withstand increased human use (e.g., in areas where there are no spotted owls or other sensitive species habitat). Zion National Park would likely offer fewer trails and designated campsites in alternative B than in the proposed action because much less of the park would be zoned primitive in alternative B. The topography in the primitive area adjacent to Lava Point and in the main Zion canyon, primarily near the river would be most conducive to improved access. In these areas, managers could upgrade existing trails and routes or provide additional narrow, unsurfaced trails or new routes.

Designated campsites also could be established in the primitive zones, albeit outside of sensitive resource areas. There would be fewer potential new campsites in this alternative than under the proposed action and alternative A because more of the park would be in pristine zones and less would be in primitive zones.

In addition to the above actions, under alternative B, water collection structures would be removed at the springs in the main Zion canyon to meet the intent of the management alternative (although they are consistent with the primitive zone conditions).

The primitive section of the North Fork of the Virgin River within the main canyon also would be restored. At a minimum, park staff would have to remove or modify all gabions, riprap, and other river structures inconsistent with the primitive zone structures (e.g., rebuild them in a manner that had less impact on natural river processes). The Park Service may make several exceptions to this requirement, however, to retain some structures that protect the main canyon road and retain the Springdale water diversion.

Pristine Zones. The Park Service would designate 113,659 acres as pristine zones in the proposed wilderness, which would include a number of trails and routes. Current or future numbers of visitors would need to be limited on the following trails and routes: Camp Creek, North and South Forks of Taylor Creek, Hop Valley, the Connector trail, Northgate Peaks, part of Wildcat Canyon, Orderville Canyon, Mystery Canyon, and upper Coalpits Wash. If visitor use levels in other pristine areas caused desired conditions to be exceeded, managers would reduce visitor use levels in these areas as well.

Because trails, clearly delineated routes (as opposed to faint routes or climbing bolts), and designated campsites are inconsistent with the desired conditions of the pristine zone, the above trails and routes, plus any designated campsites along them would be removed and the areas restored to natural conditions.

Like the proposed action, the large area east and west of the Kolob-Terrace Road in the vicinity of Grapevine Wash and the existing Firepit Knoll administrative area and its associated access road would be pristine

Management Zone Visitor Use Limits

In general, no visitor use limits would be imposed in the frontcountry high and low development zones and the transition zone, unless required by facility design capacities or to protect resources. The primitive, pristine, and research natural area zone conditions would limit the number of people that could enter these areas.

- In the **primitive** zone, group sizes for day and overnight use would be limited to eight or fewer individuals (in horse parties, the total number of people and horses combined would not exceed eight). Visitors would not expect to encounter more than 12 groups per day in the zone.
- In the **pristine** zone, group size would be limited to no more than five people. Visitors would usually not expect to encounter other groups in the zone.
- In the **research natural area** zone authorized research and guided educational group sizes would be limited to no more than eight people. Recreational use would be prohibited in research natural areas.

zones. Actions necessary to meet the desired zone conditions would be the same as those described in the proposed action (e.g., remove trails and the Firepit Knoll ranger residence and road, when the Park Service acquires the nearby inholdings).

Park managers would need to take actions in several other pristine management areas under alternative B, as follows:

- remove all of the water collection structures at the springs in the main Zion Canyon to meet the intent of the alternative; build a new water collection and treatment facility near the south entrance of the park to continue supplying water to the park
- restore the area beyond the Oak Creek maintenance area, including the access road, to natural conditions; remove the road and other signs of human use, including the research camp (four tent pads), water storage and pipeline, boneyard items, maintenance equipment, and a nursery shed

- remove well-used routes, signs, obvious natural and cultural resource damage (e.g., trampled vegetation, eroded soils, vandalized cultural sites), and other evidence of people where present on either side of the Zion-Mt. Carmel Highway and restore the areas .

The above areas would be restored either by allowing the area to naturally recover or by the use of more active measures, such as planting native vegetation. (Resources listed on the national register or are eligible for listing, including historic structures, would be maintained but would not be used for administrative or other purposes.) Faint hiking routes and bolts on climbing routes are consistent with the pristine zone conditions and would be allowed to remain in place.)

Other places under this alternative may be in pristine zones, but do not meet the desired conditions because of evidence of human use. If park staff found such areas, they would remove the evidence of human use and restore these areas to natural conditions. (Faint hiking routes, bolts on climbing routes, and historic structures and other resources listed on the national register or are eligible for listing, are allowed in the pristine zone.)

Research Natural Areas

The Park Service would designate a total of 20,470 acres as research natural areas in the proposed wilderness. This zone would apply to areas believed to be more suitable than those currently designated as research natural areas and that could be managed more consistently with the intent of the research natural area national network (see the no-action alternative). Research natural areas in alternative B would include several riparian corridors: Beartrap Canyon, Willis Creek, Goose Creek, upper La Verkin Creek, lower La Verkin Creek south of the La Verkin Creek trail (including Timber Creek south of the

trail, and Cane and Currant Creeks), Crater Hill/Dalton Wash area, the Right Fork of North Creek, the tributaries of the Left Fork of North Creek (including Wolf Springs Wash, Pine Spring Wash, and Little Creek), Gifford Canyon, Parunuweap, and most of Shunes Creek. Other research natural areas would cover all isolated mesa tops (including Timber Top, Gregory Butte, Burnt Mountain, and Crazy Quilt); a relict piñon-juniper forest; and hanging gardens in Parunuweap, the Grotto, Weeping Rock, and North Menu Falls. To manage these areas to meet desired zone conditions, they would need to be closed to general public use, with the exception of specially authorized educational trips. Other actions that could be taken would be the same as those described for research natural areas in the proposed action (e.g., provide off-site interpretation, possibly install temporary research equipment).

PROPOSED BOUNDARY ADJUSTMENTS

In alternative B, the Park Service would propose the same boundary adjustments as those described in the proposed action. A total of five land transfers with the Bureau of Land Management (totaling approximately 950 acres), nine access easements (totaling approximately 15.5 miles in length), and three conservation easements (totaling approximately 2,220 acres) would be proposed.

PROPOSALS FOR WILD, SCENIC, AND RECREATIONAL RIVER DESIGNATION

Alternative B would propose the same drainages for inclusion in the national wild and scenic river system as the proposed action. The Park Service would propose the North Fork of the Virgin River above and below the Temple of Sinawava, the East Fork of the

Virgin River, North Creek, La Verkin Creek, and Taylor Creek, and their tributaries for wild, scenic, and recreational river designation. (See table 1 for the proposed classifications.)

IMPLEMENTATION

Priorities and Funding

Like the proposed action and alternative A, the Park Service would implement the actions under alternative B over the next 15 to 20 years as funding becomes available. Partnerships with other agencies or groups would be established to implement several of these actions. Staff increases and reallocations within park programs also would be necessary to support the implementation of this alternative. Project priorities would be based on the criteria listed under the proposed action.

Under alternative B, park managers also would prepare all of the “step-down” implementation plans and studies described under the proposed action (e.g., a VERP implementation plan, wilderness management plan, climbing/canyoneering management plan, river management plan, commercial services plan). The Park Service would seek public input for preparing all of these plans and would prepare additional environmental documentation as needed to comply with the National Environmental Policy Act.

Cost Implications

Table 4 provides general cost estimates for alternative B in 1999 dollars. The table shows costs of constructing new facilities, removing facilities, rehabilitating/restoring areas, and conducting other actions. The table also shows one-time costs associated with implementing the alternative (primarily NPS employee costs associated with construction actions and implementation planning) and annual full-time employee costs (primarily associated with operating facilities and conducting research and monitoring). However, the table does not show estimates for the costs of acquiring easements or costs for expanding shuttle systems outside of the Zion Canyon, such as along the Zion-Mt. Carmel Highway. (These costs would be determined in a future transportation plan.)

The estimates are only intended to give an idea of the relative costs of alternative B compared to the other alternatives. All of the caveats regarding the cost estimates described under the proposed action also apply to these cost estimates.

TABLE 4: RELATIVE COSTS FOR MAJOR CAPITAL CONSTRUCTION AND ANNUAL OPERATIONS FOR ALTERNATIVE B

| Area and Actions | Capital Costs/ Construction | One-Time Staff Costs (# of FTEs / cost)¹ | Annual Staff Costs (# of FTEs / cost) |
|---|--|--|--|
| Kolob Canyons Area | | | |
| Modify visitor facilities, and add maintenance and administrative offices | \$315,000 | 2 FTE / \$73,000 | 0.5 FTE / \$18,000 |
| Kolob Terrace Area | | | |
| Build a focused visitor facility/ranger residence/office on BLM land, remove visitor facilities, and remove facilities and rehabilitate the Firepit Knoll area | \$556,000 | 3 FTE / \$124,000 | 4 FTE / \$142,000 |
| Lava Point Area | | | |
| Replace/add employee residences, relocate the West Rim trailhead | \$224,000 | 1 FTE / \$36,000 | -- |
| Main Zion Canyon | | | |
| Restore the North Fork Virgin River (low to high ranges), convert the lodge to a research/education facility, remove water collection structures, and build a new treatment facility. | \$4,799,000 – 5,564,000 | 3 FTE / \$127,000 | 7 FTE / \$273,000 |
| East Entrance & The Zion-Mt. Carmel Highway | | | |
| Build visitor, administrative, and maintenance facilities | \$2,660,000 | 10 FTE / \$348,000 | 8 FTE / \$295,000 |
| Other General Actions | | | |
| Manage backcountry areas, deauthorize current research natural areas, and authorize new ones | -- | 2 FTE / \$73,000 | 4 FTE / \$166,000 |
| Implementation Plans | | | |
| Prepare nine plans and studies (e.g., wilderness, climbing & canyoneering, air tour management, commercial services) | -- | 15 FTE / \$650,000 | 7 FTE / \$266,000 |
| Total Costs² | \$11,548,000 –12,581,000 | 40 FTE / \$1,574,000 | 33.5 FTE / \$1,276,000 |

Note: The table does not include costs for shuttle systems and easements.

1. FTE = full-time equivalent. One FTE is one person working 40 hours per week.

2. Administrative costs have been added to the total cost figures.

TABLE 5: SUMMARY OF THE MANAGEMENT ALTERNATIVES

| | NO-ACTION ALTERNATIVE | PROPOSED ACTION | ALTERNATIVE A | ALTERNATIVE B |
|--|---|---|--|---|
| General Management | Continue to manage Zion as in the past, relying on existing plans. | Apply a new zoning scheme, focused on a balanced approach between protecting resources and providing opportunities for quality visitor experiences. | Apply a new zoning scheme, which would provide opportunities for more widespread and increased use of Zion while still protecting park resources. | Apply a new zoning scheme, which would provide a high degree of resource protection while still providing a range of recreational opportunities. |
| Carrying Capacity | Carrying capacity not addressed. | Write additional plans to address specific types and levels of visitor use, and set carrying capacities through VERP indicators and standards. Establish a long-term program to monitor park resources and visitor experiences. | Same as the proposed action. | Same as the proposed action. |
| Overall Backcountry Visitor Use Management | Continue to limit backcountry group size to 12 people/party. Continue to allow an unlimited number of parties/area except for the areas listed below. Continue to limit visitor day use in the Left Fork of North Creek and in the Narrows from the top down. | Limit backcountry group size to 5 people/party in the pristine zone and 8 people/party in the primitive zone. Place limits on the total number of parties allowed in the pristine and primitive zones: Visitors would usually not expect to encounter other groups in the pristine zone, and generally would encounter no more than 12 groups per day in the primitive zone. Reduce visitor numbers now or in the future on nine trails and routes: Camp Creek, the Middle Fork of Taylor Creek, La Verkin Creek trail, Beartrap Canyon, Willis Creek, the Narrows from the northern park boundary to Orderville Canyon, Mystery Canyon, Dalton Wash, and upper Coalpits Wash. All recreational use would be prohibited on two routes in research natural areas (Goose and Shunes Creeks). (All trails and routes in the proposed wilderness would be subject to visitor use limits.) | Same as the proposed action. Same as the proposed action. Reduce visitor numbers now or in the future on the Narrows from the northern park boundary to Mystery Canyon and in Mystery Canyon. Prohibit all recreational use on two routes in research natural areas (upper Coalpits Wash and Shunes Creek). (All trails and routes in the proposed wilderness would be subject to visitor use limits.) | Same as the proposed action. Same as the proposed action. Reduce visitor numbers now or in the future on 17 trails and routes: Camp Creek, the North, Middle, and South Forks of Taylor Creek, upper La Verkin Creek, La Verkin Creek trail, Hop Valley, Northgate Peaks, Connector trail, the Narrows from the park boundary to Mystery Canyon, Mystery Canyon, Orderville Canyon, upper Coalpits Wash, Watchman, upper Emerald Pool, Sand Bench, and Observation Point. Prohibit all recreational use on 8 routes within research natural areas: Beartrap Canyon, Willis Creek, lower La Verkin Creek, the Right Fork of North Creek, Dalton Wash, Parunuweap, Gifford Canyon, and Shunes Creek. (All trails and routes in the proposed wilderness would be subject to visitor use limits.) |
| | Continue to limit overnight use in the Narrows, La Verkin Creek, and the West Rim trail. | Same as the no-action alternative. | Same as the no-action alternative. | Same as the no-action alternative. |
| Overall Park Development | Undertake no new construction or major management changes except for implementing the main canyon transportation system and already approved facilities (e.g., a research facility in the south entrance-main Zion Canyon area). | Build the main Zion Canyon transportation system and already approved facilities. Construct some additional minor facilities, such as focused visitor facilities, picnic sites, and employee housing. | Build the main Zion Canyon transportation system and already approved facilities. Construct a number of new developments, including picnic sites, trails, focused visitor facilities, and employee housing. | Undertake a minimal amount of new development in the park, other than the main Zion Canyon transportation system and already approved facilities. |
| Park Development And Visitor Use Management By Specific Park Area | | | | |
| Kolob Canyons Area | Undertake no new actions, maintain existing facilities. | Possibly limit the number of vehicles in the future if necessary. Possibly expand the Kolob visitor center. Possibly add focused visitor facilities. Adjust trailhead parking lots to reflect trail use capacities. | Allow unlimited traffic. Expand the Kolob visitor center. Improve or add focused visitor facilities, trailheads, trails, parking lots, and picnic areas. Adjust trailhead parking lots to reflect trail use capacities. | Possibly limit the number of vehicles in the future if necessary. Expand the Kolob visitor center. Remove the South Fork of Taylor Creek trailhead and restore the area. |

| No-Action Alternative | | Proposed Action | Alternative A | Alternative B |
|-------------------------------------|---|---|---|---|
| Kolob-Terrace Road Area | No new actions. | Remove the Firepit Knoll residence and road and restore the area. | Same as the proposed action. | Same as the proposed action. |
| | | Possibly improve existing trailheads and add picnic sites. | Same as the proposed action. | Reduce or remove trailhead parking and trails at several sites. |
| | | Build a focused visitor/ranger residence/office on BLM lands near the park boundary at North Creek. | Same as the proposed action. | Same as the proposed action. |
| | | | Build a bicycle trail and associated parking area along the road. | |
| Lava Point | Undertake no new actions; continue to maintain existing facilities. | Limit vehicle traffic if necessary. | Same as the proposed action. | Same as the proposed action except: for the addition of a focused visitor facility and nature trail. |
| | | Possibly add a focused visitor facility, nature trail, and picnic tables. | Same as the proposed action. | |
| | | Possibly expand the existing campground to a total of 12 sites. | Same as the proposed action. | Maintain the existing campground. |
| | | Replace the existing ranger residence and build a new residence to take the place of the Firepit Knoll facility. | Same as the proposed action. | Same as the proposed action. |
| | | Continue to close the roads east of the West Rim trailhead to public recreational use. | Open the roads east of the West Rim trailhead to the park boundary to public motorized use. | Gate and close the road near the Lava Point ranger residence to motorized visitor access beyond that point. Move the West Rim trailhead to the ranger station/residence area. |
| South Entrance And Main Zion Canyon | Undertake no new actions except for the implementation of the main canyon shuttle system, related infrastructure, and other facilities in previously approved plans. Continue to maintain existing facilities. | Possibly add picnic sites in disturbed areas, in addition to facilities approved in other plans. | Same as the proposed action. | Same as the proposed action. |
| | | Continue to maintain existing facilities. | Same as the proposed action. | Remove facilities and structures from Oak Creek above the maintenance area. |
| | | Continue existing activities. | Same as the proposed action. | Reduce the number and frequency of shuttles going past the lodge. Reduce visitor numbers on several frontcountry trails. |
| | | | | Remove the horse concession operation on the Sand Bench trail. |
| Zion Canyon Lodge | Undertake no major change in the functions and operation of the lodge. | Same as the no-action alternative. | Same as the no-action alternative. | Convert the lodge into a facility for research and science-based education. |
| | Continue to maintain the historic qualities of the lodge through contract provisions and in a commercial services plan. | | | |
| North Fork Of The Virgin River | Maintain the existing riverbank armor and levees. | Prepare a river management plan(s) to identify strategies for managing visitor use and determine how and where parts of the river channel and floodplain would be restored to a more natural condition. | Same as the proposed action. | Same as the proposed action; |
| | | | | Remove all water collection structures at springs in the main canyon. Possibly install a new water treatment facility in the park. |

| | No-ACTION ALTERNATIVE | PROPOSED ACTION | ALTERNATIVE A | ALTERNATIVE B |
|---|--|---|---|---|
| East Entrance And The Zion–Mt. Carmel Highway Area | Undertake no new actions; continue to maintain existing facilities. | Possibly implement a voluntary shuttle system. | Same as the proposed action. | Implement a mandatory shuttle system. (Continue to permit nonrecreational and community traffic to drive the road.) |
| | | Possibly add a focused visitor facility, one or two short nature trails, and a few picnic sites and restrooms in previously disturbed areas. | Same as the proposed action. | Build a full service visitor center near the east entrance. |
| | | Develop parking areas and trailheads for the East Mesa and East Rim trails. Remove and rehabilitate some pullouts along the Zion - Mt. Carmel Highway. | Same as the proposed action. | Develop parking areas and trailheads for the East Mesa and East Rim trails; redesign parking areas along the Zion - Mt. Carmel Highway, and remove and rehabilitate all pullouts. |
| Proposed Wilderness, Potential Wilderness, And Nonwilderness (in acres and percentage of the park. Potential wilderness areas are those areas that satisfy criteria for wilderness designation but are not included in the wilderness proposal; they are primarily private inholdings.) | Proposed wilderness: 135,523 acres (92%) Potential wilderness: 3,601 acres (2%) Nonwilderness: 8,891 acres (6%) | Proposed wilderness: 139,295 acres (94%) Potential wilderness: 5,546 acres (4%) Nonwilderness: 3,175 acres (2%) | Proposed wilderness: 137,347 acres (93%) Potential wilderness: 4,814 acres (3%) Nonwilderness: 5,855 acres (4%) | Proposed wilderness: 141,029 acres (95%) Potential wilderness: 5,560 acres (4%) Nonwilderness: 1,427 acres (1%) |
| Research Natural Areas | Continue to manage the three existing research natural areas, covering about 31,000 acres (21% of the park), as they have in the past. | Exclude parts of the Narrows, Watchman, Sand Bench, upper Emerald Pools, Observation Point, and Timber Creek Overlook trails in transition zones from the proposed wilderness area. | Same as the proposed action. | Exclude the Timber Creek Overlook trail from the proposed wilderness area. |
| | | Deauthorize the three existing research natural areas. | Deauthorize the three existing research natural areas. | Deauthorize the three existing research natural areas. |
| | | Authorize 5,168 acres (3% of the park) as new research natural areas and manage the RNAs as per NPS policy. | Authorize 5,310 acres (4% of the park) as new research natural areas and manage the RNAs as per NPS policy. | Authorize 20,526 acres (14% of the park as new research natural areas and manage the RNAs as per NPS policy. |
| | | Limit educational, research, and administrative groups to eight or fewer people/group. | Same as the proposed action. | Same as the proposed action. |
| Parunuweap Canyon | Continue to close the canyon to the public. | Open the main canyon to limited NPS or NPS-sanctioned guided interpretive trips between June 16 and January 15. | Same as the proposed action. | Designate the entire canyon as a research natural area and allow limited use by authorized researchers. |
| Proposed Wild & Scenic River Designations | Propose no drainages for addition to the national wild and scenic river system. | Recommend five drainages and their tributaries as eligible and suitable for addition to the national wild and scenic river system: <ul style="list-style-type: none"> the North Fork of the Virgin River above and below the Temple of Sinawava the East Fork of the Virgin River North Creek La Verkin Creek Taylor Creek | Same as the proposed action. | Same as the proposed action. |
| Proposed Boundary Adjustments | Propose no boundary adjustments or access or conservation easements. | Propose five BLM areas, totaling approximately 950 acres, for transfer to the park. | Same as the proposed action. | Same as the proposed action. |
| | | Propose nine access easements, totaling about 15 miles, on lands outside the park boundary. | | |
| | | Propose three conservation easements, totaling 2,220 acres, on private lands outside the park. | | |

TABLE 6: COMPARISON OF THE MANAGEMENT ZONES AND WILDERNESS PROPOSALS IN THE ACTION ALTERNATIVES
(acres)

| ZONE | NONWILDERNESS | POTENTIAL WILDERNESS* | PROPOSED WILDERNESS | TOTAL ACRES | % OF PARK |
|-------------------------------|---------------|-----------------------|---------------------|----------------|------------|
| Proposed Action | | | | | |
| Frontcountry High Development | 636 | 0 | 0 | 636 | 0.4 |
| Frontcountry Low Development | 813 | 0 | 0 | 813 | 0.5 |
| Transition | 1,398 | 0 | 0 | 1,398 | 0.9 |
| Primitive | 84 | 18 | 16,351 | 16,453 | 11 |
| Pristine | 0 | 5,506 | 117,776 | 123,282 | 83 |
| Research Natural Area | 0 | 0 | 5,168 | 5,168 | 3 |
| Administration | 244 | 22 | 0 | 266 | 0.2 |
| Total | 3,175 | 5546 | 139,295 | 148,016 | 99 |
| Alternative A | | | | | |
| Frontcountry High Development | 987 | 0 | 0 | 987 | 0.7 |
| Frontcountry Low Development | 3,128 | 0 | 0 | 3,128 | 2 |
| Transition | 1,450 | 0 | 0 | 1,450 | 1 |
| Primitive | 66 | 3,854 | 86,569 | 90,489 | 61 |
| Pristine | 0 | 891 | 44,515 | 45,406 | 31 |
| Research Natural Area | 0 | 47 | 6,263 | 6,310 | 4 |
| Administration | 224 | 22 | 0 | 246 | 0.2 |
| Total | 5,855 | 4,814 | 137,347 | 148,016 | 100 |
| Alternative B | | | | | |
| Frontcountry High Development | 273 | 0 | 0 | 273 | 0.2 |
| Frontcountry Low Development | 871 | 0 | 0 | 871 | 0.6 |
| Transition | 49 | 0 | 0 | 49 | < 0.1 |
| Primitive | 66 | 7 | 6,900 | 6,973 | 5 |
| Pristine | 0 | 5,475 | 113,659 | 119,134 | 80 |
| Research Natural Area | 0 | 56 | 20,470 | 20,526 | 14 |
| Administration | 168 | 22 | 0 | 190 | 0.1 |
| Total | 1,427 | 5,560 | 141,029 | 148,016 | 100 |

NOTE: All acreages were calculated using GIS data layers, graphical display, and summary statistics. Total acreages and percentages vary between the alternatives dues to rounding. The acre figures may not correspond with legal description acre figures.

*Potential wilderness areas are lands that do not qualify for immediate designation due to temporary nonconforming or incompatible uses (e.g., private inholdings, private water rights). The Park Service would designate these areas as wilderness, if authorized by Congress, upon termination of the nonconforming uses.

TABLE 7: SUMMARY OF THE IMPACTS OF THE ALTERNATIVES

| TOPIC/RESOURCE VALUE | NO-ACTION ALTERNATIVE | PROPOSED ACTION | ALTERNATIVE A | ALTERNATIVE B |
|--|--|--|------------------------------|---|
| Air Quality | Minor to moderate, localized, increase in air quality impacts due to increase in expected visitation and retention of existing traffic patterns and vehicle use. | Same as the no-action alternative, except air quality may improve compared to the no-action alternative because the number of vehicles on the Kolob Canyons Road may be limited in the future. | Same as the proposed action. | Minor to moderate improvement in air quality due to: the reduction in number of facilities and visitor use levels; the institution of a mandatory shuttle system on the park's east side; possible limits on vehicle numbers on the Kolob Canyons and Kolob-Terrace Roads; and the reduction in the number and frequency of the Zion Canyon shuttles. |
| | | Minor, short-term decrease in local air quality due to construction activities. | Same as the proposed action. | Same as the proposed action. |
| Water Quality | Moderate, localized, adverse affects on water quality due to increased use. | Minor, localized adverse effects on water quality, such as increased turbidity, sedimentation, and bacterial contamination, due to increased use. Mitigation would include visitor management, improved waste management, and visitor education. | Same as the proposed action. | Minor long-term improvement in water quality due to decreased use and improved visitor management. Mitigation would be similar to the proposed action. |
| | | Minor, short-term increases in turbidity and sedimentation during construction, which could be mitigated through accepted construction practices. | Same as the proposed action. | Same as the proposed action. |
| | | Moderate, short-term increases in turbidity from river restoration measures. Occasional episodes of increased turbidity and sedimentation would occur for several years as the channel adjusts. | Same as the proposed action. | Same as the proposed action. |
| Floodplain of the North Fork of the Virgin River | Zion Lodge and the park support facilities at Birch Creek would remain within the probable maximum floodplain because no reasonable alternative locations are available. | Same as the no-action except for the addition of new picnic areas. | Same as the proposed action. | Same as the proposed action. |
| | Minor to moderate, long-term increase in the number of people exposed to flood hazards in Zion Canyon due to increased day use. | Same as the no-action alternative except for a minor increase in the number of people exposed to flood hazards in Zion Canyon due to the addition of picnic areas within the probable maximum floodplain. | Same as the proposed action. | Minor decrease in the number of people exposed to flood hazards due to decreased day use in primitive zones. |
| | Moderate to major, long-term impairment of floodplain functions/processes would continue along 4.5 miles of river in the park due to past channelization. Moderate to major, adverse cumulative impacts on natural floodplain values would result. | Major, long-term, beneficial effect on natural river function/values along portions of the river in the park and moderate, beneficial, cumulative impact on natural floodplain values due to river restoration. | Same as the proposed action. | Same as the proposed action. |

| TOPIC/RESOURCE VALUE | NO-ACTION ALTERNATIVE | PROPOSED ACTION | ALTERNATIVE A | ALTERNATIVE B |
|------------------------------|---|--|--|--|
| Riparian/Wetland Communities | Continued decline and increased dryness of the riparian system along 4.5 miles of the river as a result of the isolation of the North Fork from its floodplain in portions of Zion Canyon. Moderate to major impacts on riparian communities along the North Fork within the park, with the greater impact occurring along the channelized and heavily used sections of the North Fork. Incrementally small loss of riparian habitat in the region, but this still would contribute to the continuing loss of riparian areas within the Virgin River watershed. | Moderate, long-term, beneficial impacts on riparian communities from permitting the river to use the floodplain in a much more natural manner. Moderate, beneficial effects from the incremental increase in riparian acreage within the Virgin River watershed. | Same as the proposed action. | Same as the proposed action. |
| | Minor impacts, with mitigation, to other park riparian areas, due to recreational use. | Same as the no-action alternative. | Same as the no-action alternative. | Moderate beneficial effects based on decreased use of many backcountry canyon bottom trails/routes, particularly within the fairly extensive riparian corridor along the Left Fork. |
| | | | | Minor, long-term, beneficial impacts because of the restoration of the natural flows of six springs, which in turn would restore the small streams and riparian zones supported by these springs to more natural conditions. |
| Hanging Gardens | Continued potential for impacts on hanging gardens not protected by barriers. Minor, short-term, adverse impacts on gardens due to mitigation that limits damage or loss of vegetation. | Long-term, positive effects due to zoning four locations with hanging gardens as research natural areas, which would help limit future visitor impacts. Continued potential for visitors to adversely affect other hanging gardens; minor, short-term impacts with mitigation measures. | Same as the proposed action. | Same as the proposed action. |
| Microbiotic Crusts | Continued localized, long-term, moderate to major, negative impacts on microbiotic crusts within areas of extensive development and trail use. Minor impacts on microbiotic crusts from a parkwide standpoint because most of the approximately 75,000 acres of park lands likely supporting microbiotic crusts would not be subject to disturbance. | Same as the no-action alternative except microbiotic crusts in additional areas would be affected by new development — primarily along the East Entrance and Zion-Mt. Carmel Highway, Kolob-Terrace Road, Kolob Scenic Road, and lower Zion Canyon. | Same as the proposed action except for effects to additional microbiotic crusts due to new developments, such as a bike trail paralleling the Kolob-Terrace Road and additional picnic sites along the Kolob Canyons Road. | Minor to moderate, localized reduction in soil compaction and erosion, primarily along the Zion-Mt. Carmel Highway, due to zoning. |
| Virgin Spinedace | Long-term, minor to moderate, adverse impact on spinedace habitat from diminished pool/riffle habitat and riparian vegetation in portions of the North Fork due to river stabilization measures. | Minor to moderate, long-term benefit to the North Fork population due to river restoration measures that potentially enhance the spinedace population within disturbed areas. Major, long-term, cumulative benefit due to further protection and potential enhancement of this population. | Same as the proposed action. | Same as the proposed action. |
| | | Negligible short-term increases in turbidity due to river restoration activities. | Same as the proposed action. | Same as the proposed action. |
| | Continued reduction in the abundance of larval fish and the ability of fish to feed in high recreational use areas. Major, long-term impact on the population may result if high levels of recreational use occurred on an increasingly greater proportion of the river. | The potential for new impacts would be minimized along the North Fork based on increased visitor management, although the ability of fish to feed would continue to be adversely affected due to turbidity in high use recreational areas. | Same as the proposed action. | Same as the proposed action. |
| | Negligible impacts on spinedace populations elsewhere in the park due to low or restricted visitor use levels. | Negligible to minor impacts on spinedace populations elsewhere in the park due to low or restricted visitor use levels resulting from zoning. | Same as the proposed action. | Same as the proposed action. |

Table 7: Summary of the Impacts of the Alternatives

| TOPIC/RESOURCE VALUE | NO-ACTION ALTERNATIVE B |
|---|---|
| Mexican Spotted Owls | Not likely to adversely affect owl populations, with most known owl habitat zoned research natural area and pristine. This potential impact would have the least potential of all the canyons; alternatives for disturbance of the owls. assess potential use restriction |
| Desert Bighorn Sheep | Continued avoidance of visitor use impacts on lambing areas due to lambing areas as research natural areas. Negligible to minor Parunuweap impacts from sheep research activities. Minor to moderate benefit to sheep from prohibiting or slightly reducing areas due to for use in most of the sheep's foraging range, primarily frequently used Parunuweap and Shunes Canyons and other areas south of impacts could Zion-Mt. Carmel Highway. from key portion |
| Natural Quiet | Minor to moderate decrease in noise impacts due to reduction in sounds due to number of facilities and visitor use levels and mandatory and retention of shuttle system on park's east side. Minor decrease in noise vehicle use. impacts if vehicle numbers are limited on the Kolob Canyons and Kolob-Terrace Roads. |
| Range of Experiences/Activities in the Park | Overall long-term, moderate to major, negative impacts on the impact on the experiences of many visitors in the frontcountry and experience moderate, negative impacts on visitor experiences in the quality and backcountry due to: fewer opportunities to experience Zion popular areas on above the lodge; fewer opportunities to stay and solitude overnight in the park and to ride horses; reduced personal increased choices generated by the mandatory Zion-Mt. Carmel frontcountry attitude in this part of the park; and decreased opportunities Canyon; and experience the backcountry due to new use limits. to much of positive impact to backcountry visitors based on improved opportunities for solitude and quiet in most areas of the park, and positive impact on some visitors and school groups who use the new education/research center. |
| Recreational Facilities Nearby to the Park | Negligible to moderate as the proposed action. experiences increased visitor people to near |
| Socioeconomic Environment | Negligible, overall, negligible to minor, negative change in the local/regional economy. Minor to moderate, negative effects some businesses and individuals based on reduced for use and removal of commercial activity in the park. moderate to major, negative impacts on the concession business and their employees. Benefits to other businesses and individuals due to the elimination of competition and on some development projects in the park. |

| TOPIC/RESOURCE VALUE | NO-ACTION ALTERNATIVE | PROPOSED ACTION | ALTERNATIVE A | ALTERNATIVE B |
|---|--|--|---|---|
| Mexican Spotted Owls | Not likely to adversely affect the productivity of known owl territories due to: the mitigation of potential impacts from closures and signing of side canyons; continued monitoring of spotted owl to assess potential impacts; and implementation of use restrictions, if necessary. | Not likely to adversely affect the productivity of known owl territories due to the mitigation of potential impacts: most owl habitat zoned pristine; trail closures and signing of side canyons off of the main Zion Canyon as necessary; continued owl monitoring; and restrictions on backcountry camping locations. Impacts also avoided with consultation with the U.S. Fish and Wildlife Service prior to the construction of new picnic areas and trails along the Zion-Mt. Carmel Highway. | Not likely to adversely affect the productivity of known owl territories, due to most owl habitat zoned primitive and pristine, appropriate mitigation measures, and consultation with the U.S. Fish and Wildlife Service. | Not likely to adversely affect owl populations, with most habitat zoned research natural area and pristine. This alternative would have the least potential of all the alternatives for disturbance of the owls. |
| Desert Bighorn Sheep | Continued protection from disturbance of all known lambing areas due to year-round closures of Parunuweap and Shunes Canyons. Minor to moderate impacts on sheep in foraging areas due to the potential for unlimited visitor use in frequently used portions of their range. Major impacts could occur, should sheep be displaced from key portions of their range. | Avoidance of visitor use impacts on lambing areas due to zoning and seasonal visitor use closures. Negligible to minor impacts from sheep research activities. Negligible to minor visitor disturbance to sheep in foraging areas due to zoning, which would permit only low, restricted levels of visitors, and seasonal closures. Minor benefit to sheep from limiting and reducing use in Gifford Canyon, an important sheep use area. | Same as the proposed action. Negligible to minor visitor disturbance to sheep in foraging areas due to zoning, which would allow only very low, restricted levels of use, and seasonal closures. Minor to moderate impacts on sheep in foraging areas along the Zion-Mt. Carmel Highway due to the potential for increased visitor use over a large portion of the sheep's range. Major impacts could occur, should sheep be displaced from key portions of their range. | Avoidance of visitor use impacts on lambing areas due to zoning as research natural areas. Negligible to minor impacts from sheep research activities. Minor benefit to sheep from prohibiting or slightly reducing visitor use in most of the sheep's foraging range, primarily Parunuweap and Shunes Canyons and other areas south of the Zion-Mt. Carmel Highway. |
| Natural Quiet | Minor to moderate, long-term decrease in natural sounds due to the expected increase in visitation and retention of existing visitor use patterns and vehicle use. | Minor to moderate, long-term decrease in natural sounds due to increases in use levels. Minor reduction in noise levels if vehicle use is reduced on the Kolob Canyons Road. Minor reduction in noise levels with the voluntary shuttle system on the east side. | Moderate increase in noise levels with higher use levels. Minor reduction in noise levels with the voluntary shuttle system on the east side of the park. | Moderate decrease in noise impacts due to reduction in number of facilities and visitor use levels and mandatory shuttle system on park's east side. Minor decrease in noise impacts if vehicle numbers are limited on the Kolob Canyons and Kolob-Terrace Roads. |
| Range of Experiences/Activities in the Park | Overall long-term, minor to moderate, negative impact on the range and quality of the visitor experience based on: gradual decrease in the quality and range of recreational opportunities in popular areas; diminished opportunities for quiet and solitude in areas not closely managed; increased crowding and traffic congestion in frontcountry areas other than the main Zion Canyon; and continued unrestricted visitor access to much of park. | Overall, moderate, positive impact on most visitor experiences in the front and backcountry based on: enhanced educational/recreational opportunities; improved opportunities for solitude and quiet in most of the park; and new opportunities to experience other parts of the park, including Parunuweap. But front-country experiences would be more structured than now. Use levels on several trails would be reduced now or in the future. Some visitors may feel their personal choices in and access to the proposed wilderness were being curtailed. | Overall, moderate, positive impact on most visitor experiences in the frontcountry and moderate, positive and negative impacts on visitor experiences in the backcountry due to: expanded frontcountry scenic driving and biking opportunities and backcountry hiking opportunities; moderately improved opportunities for solitude in most areas; and a number of additional opportunities for visitors to enjoy the park's proposed wilderness, including Parunuweap. Adverse effects on some visitors due to higher encounter levels with other visitors and reduced levels of use on several trails now or in the future. | Overall, moderate to major, negative impacts on the experiences of many visitors in the frontcountry and moderate, negative impacts on visitor experiences in the backcountry due to: fewer opportunities to experience Zion Canyon above the lodge; fewer opportunities to stay overnight in the park and to ride horses; reduced personal choices generated by the mandatory Zion-Mt. Carmel shuttle in this part of the park; and decreased opportunities to experience the backcountry due to new use limits. Positive impact to backcountry visitors based on improved opportunities for solitude and quiet in most areas of the park, and positive impact on some visitors and school groups who use the new education/research center. |
| Recreational Facilities Nearby to the Park | Negligible to minor, negative effect on the experiences provided at these areas, with increased visitation and the displacement of a few people to nearby recreational areas. | Minor, negative effect on the experiences provided at nearby recreational areas, due to the displacement of some visitors from Zion caused by increased visitor management. | Same as the proposed action. | Same as the proposed action. |
| Socioeconomic Environment | Negligible, positive contribution to the overall local/regional economy. Continued moderate to major positive contribution to the local economy. | Overall negligible, positive change in the local/regional economy. Moderate to major, positive effect for a small number of businesses and individuals, based on increased visitation and various construction projects. | Overall, negligible to minor, positive change in the local/regional economy, with increased park use and additional construction projects. Moderate to major, positive, economic benefits to some individuals and firms. | Overall, negligible to minor, negative change in the local/regional economy. Minor to moderate, negative effects on some businesses and individuals based on reduced visitor use and removal of commercial activity in the park. Moderate to major, negative impacts on the concession business and their employees. Benefits to other businesses and individuals due to the elimination of competition and from some development projects in the park. |

AFFECTED ENVIRONMENT



INTRODUCTION

The “Affected Environment” describes the existing environment of Zion and the surrounding region. The focus of this part is on key park resources, uses, facilities, and socioeconomic characteristics that have the potential to be affected by the alternatives should they be implemented. Some additional features are discussed because they provide context, and/or must be considered in

environmental impact statements (e.g., floodplains, certain threatened and endangered species). For additional information on Zion’s natural and human environment, see Connor and Vetter (1986), Crawford (1986, 1988), Euler (1966), Hamilton (1992), NPS (1994a), Schroeder (1955), Stoffle et al. (1995), Wauer (1965), Wauer and Carter (1965), and Welsh (1990).

NATURAL RESOURCES

AIR QUALITY

Zion National Park is designated a class I area under the Clean Air Act. This designation means that air quality characteristics, including visibility, can be degraded the least compared to other Clean Air Act designations. Current local sources of pollution include particulate matter from campfires and wood stoves, and vehicle emissions. Long-distance transport of emissions to the park occurs from regional pollution sources, such as coal-fired generating plants and large urban areas. These sources of pollution affect visibility by introducing haze into the sky. There are no point source pollution sources currently visible from the park.

WATER QUALITY

Water quality conditions in Zion National Park do not vary dramatically from source to source, though individual streams may vary considerably over time particularly in turbidity and suspended sediment. Springs from the base of the Navajo sandstone are moderately low in dissolved solids (specific conductance near 300 $\mu\text{mhos/cm}$), while streams draining from higher or lower strata have higher concentrations. Of the major rivers in the park, La Verkin Creek and North Creek have the highest levels of mineralization (specific conductance near 1000 $\mu\text{mhos/cm}$), while the North and East forks of the Virgin River show somewhat lower levels (specific conductance of 600-800 $\mu\text{mhos/cm}$). The presence of dissolved metals in drinking water in excess of drinking water standards has rarely occurred. Thus, these events appear to be anomalies rather than identifiable problems.

Sediment and turbidity are the most significant water quality characteristics of the rivers and streams in the park. While most streams are

relatively clear during periods of low flow, high flows are accompanied by large increases in sediment transport and turbidity. Most of the sediment movement occurs during spring runoff, which may last several weeks, and during very brief runoff events following summer thunderstorms. The total sediment transport of the North Fork of the Virgin River is estimated to be 200,000 tons/year. Most of this appears to be natural, although it may be enhanced by road building and grazing on the watershed.

The greatest water quality concern for most visitors is contamination from fecal bacteria. Though analyses have been limited, bacterial levels have exceeded the standard for full-body contact recreation 20% to 30% of the time. No closures or advisories have been issued regarding bacterial contamination of waters in the park, however. Probable sources of fecal bacteria include residences, livestock and wildlife upstream of the park, recreational activity, and wastewater treatment systems. Visitors engaged in water play are at risk of ingesting contaminated water and becoming infected by enteric diseases. Natural turbidity as well as sediment stirred up by water play probably increase bacteria levels.

NORTH FORK OF THE VIRGIN RIVER FLOODPLAIN

The North Fork of the Virgin River is the main drainage through Zion Canyon. The river experiences wide fluctuations in flow with a seasonal snowmelt peak in the spring followed by generally low summer and fall flows. Occasional heavy storms, which can occur at any time of the year but are more common in summer and early fall, produce the largest flows in the Virgin River system. These runoff events are usually of short duration and can occur suddenly. Floods in desert regions like

Zion are often accompanied by large quantities of debris and sediment, increasing the impact of floods.

The morphology of Zion Canyon has been shaped by landslide activity. About 6,000 years ago, a very large landslide dammed the river, forming a lake that extended 4 to 5 miles upstream to the mouth of the Narrows. The sediments deposited in this lake form the relatively flat canyon floor. Prior to channelization, the Virgin River meandered across the canyon floodplain, spilling over its banks in roughly two out of three years. The geologic record, as interpreted by Hereford et al. (1995), shows that the river underwent cycles of down cutting and deposition, which were influenced by climate trends.

Through much of the lower Zion Canyon (i.e., from the park's south boundary to the Canyon Junction bridge), the 100- and 500-year floodplains closely follow the banks of the Virgin River. An earthen levee system present along the riverbanks through the Watchman campground has altered the historic floodplains in this area. The probable maximum flood area flows out into open areas of the park, portions of the housing areas, campgrounds, and much of the valley floor. All of the existing park facilities near Oak Creek are within the probable maximum floodplain of that creek. The current visitor center parking area, resource management offices, and one historic residence are within the 100-year floodplain of Oak Creek; the visitor center, most other housing, and the maintenance area are within the 500-year floodplain; and two houses are outside of the 500-year floodplain. The water tank and corrals at Birch Creek are within the probable maximum floodplain of the river.

The channel of the North Fork above Birch Creek was channelized in the 1920s and 1930s to protect the newly constructed Zion Lodge. The stream was confined to the western-most portion of the 1,000 foot-wide floodplain by excavating the channel deeper and by building

Floodplain Definitions

100-year floodplain: the average maximum flood that can be expected to occur every 100 years or that has a 1% chance of occurring in any given year. Floods of this magnitude occur frequently enough to pose a serious threat to facilities and people.

500-year floodplain: the average maximum flood that can be expected to occur every 500 years

Probable maximum flood: the largest flood that can reasonably be expected to occur in a drainage. However, these floods are rare, and their statistical probability of occurring is uncertain. The floodplain that is subject to regulation by Executive Order 11988 (Floodplain Management) and the NPS guidelines for floodplain compliance is the probable maximum floodplain in a flash flood area.

a levee along the eastern side of the channel for about 2 miles. The levee is armored with gabions (heavy wire baskets filled with rock) for much of its length. Although the wires along the bottom of many of the gabions have rusted away, the levees have been periodically repaired. They have remained effective in isolating the river from the floodplain, even when large floods have occurred (up to 10,000 cubic feet per second).

RIPARIAN/WETLANDS COMMUNITIES/HANGING GARDENS

Riparian communities comprise an important segment of the park's vegetation. These riparian areas are directly influenced by permanent water and include land and vegetation adjacent to rivers, streams, springs, and seeps. The riparian communities in Zion include nearly 25 miles of perennial streams. These communities tend to be rare, small, or linear locales, separated by vast expanses of more arid lands. The riparian areas support the richest flora and avian fauna in the park and are important wildlife habitat for many species. Due to their linear nature, the riparian areas serve as connectors between habitat types and provide travel routes for wildlife.

In many areas within Zion, riparian communities are relatively intact. As shady, cool, wet areas, they are disproportionately preferred by users over the surrounding arid lands. The North Fork of the Virgin River is one of the most popular destinations in the park during the warm summer months.

Some reaches of the North Fork have been channelized. Levees and constricted bridge crossings, among other factors, have caused downcutting of the channel, reducing the frequency of flooding and lowering alluvial ground water. This has resulted in a loss of wetland and riparian vegetation. Also, riverbank-protection structures along much of the North Fork have provided stable banks in areas that were formerly very dynamic. This unnaturally stable fluvial environment inhibits the regeneration of riparian vegetation, such as willow and cottonwood. Lack of an understory is evident, offering little replacement for the existing older, decadent overstory. Nonnative vegetation, such as ripgut brome and cheatgrass, also dominate previously disturbed areas and have displaced native riparian species.

Hanging gardens are a unique, diverse and important community in the Zion Park desert. They occur on vertical, shaded sandstone faces where water seeps from the rock. Moisture and shading from direct sun provide habitat for species requiring cooler, wetter conditions. The Zion snail is one such species. This snail is endemic to the park and has been found only within some hanging gardens along the North Fork of the Virgin River.

Weeping Rock is a primary visitor attraction, as are the hanging gardens at Emerald Pools. Other gardens line portions of the Narrows trail. A number of smaller gardens occur throughout the park where seeps and springs issue from the exposed sandstone. Some of the springs associated with hanging gardens, the Grotto, Temple of Sinawava, and Birch Creek, are used as park water sources.

Impacts on hanging gardens occur when people run their hands across the area, which removes vegetation and possibly rubs Zion snails, a rare, endemic species, off the surface. Trails and barriers already in place would continue to prevent contact with the gardens. The potential for damage or loss of vegetation based on increased visitation in fragile areas would be limited with the continuation of these mitigation measures.

MICROBIOTIC CRUSTS

Microbiotic crusts — an intricate network of cyanobacteria, algae, mosses, and fungi — contribute to many ecosystem functions, including soil stability, nitrogen fixation, nutrient contributions, seedling establishment, and plant-water relationships. These crusts are extremely intolerant of disturbance; just one step can destroy the delicate sheaths and filaments that hold the soil together. Without continued disturbance, crusts will begin reestablishing immediately; however, it may be several decades before mature crusts with algae and fungi develop. Continued activities that disturb the upper soil layer will have an adverse impact on microbiotic crusts.

Zion National Park does not have detailed field surveys to determine the distribution of microbiotic crusts. These crusts are, however, typically associated with open canopies and sandy soil usually found in piñon/juniper forests and desert-shrub communities. Using existing vegetation and soils information, a model of the distribution of microbiotic crusts in the park predicts that they occur on 74,700 acres, or about 50% of the park.

MEXICAN SPOTTED OWLS

Zion National Park is within the Colorado Plateau Recovery Unit for the Mexican spotted owl (*Strix occidentalis lucida*), which is listed as a federally threatened species. The Mexican spotted owl reaches the northwestern

limits of its range in this recovery unit. Owl habitat appears to be highly fragmented. In southern Utah, breeding owls primarily inhabit deep, steep-walled canyons and hanging canyons. They nest and roost in caves and on ledges. Most owls remain in the same territory year after year. They hunt primarily at night, and in the Colorado Plateau Recovery Unit they take more woodrats and fewer birds.

There are 87 known spotted owl territories on the Colorado Plateau (USFWS 1995). Zion has 17 (possibly 18) known territories, which are widely distributed. A spotted owl monitoring program for the park was initiated in 1995. Researchers believe that the relatively undisturbed lands of national parks on the Colorado Plateau, including Zion, serve as important centers for populating adjacent lands.

Potential threats to owls and their habitat in the northwestern portion of the Colorado Plateau Recovery Unit, including Zion, are recreation, overgrazing, and road development within canyons. Catastrophic fire and timber harvest within upland forests, which are potentially used for foraging, dispersal, and wintering, are additional threats (USFWS 1995).

VIRGIN SPINEDACE

The native fish community of the Virgin River has experienced population declines due to modification and loss of habitat, habitat fragmentation, and the introduction of nonnative species that compete with and prey on native species. This community is in relatively natural abundance only in Zion National Park and for a short distance downstream, as well as in a segment of the Santa Clara River. Native fish communities within the park are relatively intact, and include two minnows — the Virgin spinedace (*Lepidomeda mollispinis mollispinis*) and speckled dace (*Rhinichthys osculus*) — and two suckers — the

flannelmouth sucker (*Catostomus latipinnis*) and desert sucker (*Catostomus clarki*).

Virgin spinedace are typically found in clear, cool, swift streams that have interspersed pools, runs, and riffles. They are primarily insectivorous, feeding on a wide range of insects and occasionally plant material and organic debris. Virgin spinedace feed on drifting prey in midwater and at the surface.

Because habitat for the Virgin spinedace has been altered throughout most of its range in the Virgin River, the major portion of the fish's remaining population lives within the park. Virgin spinedace are found along the North Fork of the Virgin River, East Fork of the Virgin River, a portion of Shunes Creek, and a very short section of North Creek just inside the park boundary. Along the North Fork, Virgin spinedace occur from the park's south boundary to the Temple of Sinawava and are suspected to occur at least as far upstream as Orderville Canyon, although this has not been confirmed (Valdez et al 1991). Their distribution along the East Fork is from the western end of Parunuweap Canyon to Parunuweap Falls.

The National Park Service is part of a coalition of federal and state agencies that have signed a conservation agreement for the Virgin spinedace in 1995. The conservation agreement was developed to expedite conservation measures needed for the continued existence and recovery of the species.

DESERT BIGHORN SHEEP

Desert bighorn sheep were historically present in and around the park until the 1950s when they were extirpated due to hunting pressure, habitat loss, and disease. Transplanted bighorns were released in Parunuweap Canyon in 1973 and in lower Zion Canyon in 1978. The herd and its use are concentrated

around lower Zion and Parunuweap Canyons, in the vicinity of their releases. Their range extends north, from Parunuweap Canyon to just north of the Zion-Mt. Carmel Highway. Main lambing areas are within Parunuweap and Shunes Canyons. Bighorns tend to occupy habitat consisting of open cliffs and immediately adjacent steep, open hillsides with herbaceous vegetation. They escape predators best on steep, cliff terrain; they tend to avoid forested areas and low lying, flat terrain where they are vulnerable to predation.

There are no present threats to the sheep because very few uses are allowed within the sheep's habitat. No use is allowed in the lambing areas of the park.

THE NATURAL SOUNDSCAPE

An important resource at Zion National Park is the natural soundscape. Sometimes referred to as "natural quiet" and "natural ambient sounds," the natural soundscape includes not only the quiet but the entire symphony of natural sounds found in the park, including: silence, the sounds of canyon wrens and dripping water at hanging gardens echoing off the canyon walls, the call of a raven or piñon jay from a mile away, the rustle of wind in the trees, the buzzing of insects, and the roaring of river rapids.

In October 1998, park staff measured the natural ambient sound environment at several locations in the park. (NPS 1998d) The results are summarized in table 8. Because sound levels change over time with the natural environment (e.g., wind and other climatic conditions), several different representations of the natural ambient levels are provided to present a clearer picture of the park's soundscape. The units shown in the table are A-weighted decibels (dBA), which is a standard unit of measurement for sound tailored to human hearing. Each 10 dBA increase on the decibel scale represents an increase of ten times the amount of sound energy, which is perceived by humans as a doubling of the loudness. As a point of reference, a conversation between two people would typically measure about 60 dBA, and typical suburban daytime readings would be in the 50-60 dBA range. Sound levels in the 20-30 dBA range would be found late at night inside a single family residence, with all windows closed, no internal noise sources operating (such as heating or ventilating systems) and no local traffic in the vicinity.

A single decibel value, however, does not provide much useful information about how audible a noise source might be in a given natural soundscape. This is because sound is composed of a complex pattern of sound energy levels that vary across a spectrum of sound frequencies. The most important factors

TABLE 8: MEASURED NATURAL AMBIENT SOUND LEVELS AT ZION NATIONAL PARK

| Location | Date of Measurements | Range of Measured Natural Ambient Levels in decibels (dBA) | Measured Natural Ambient Levels (one hour Leq in decibels (dBA)) | Natural Ambient %Time Audible | Median Natural Ambient Levels (L ₅₀) in decibels (dBA) | Natural Ambient L ₉₀ in decibels (dBA) |
|-----------------|----------------------|--|--|-------------------------------|--|---|
| Angel's Landing | 16 Oct '98 | 38 – 50 | 42 | 46% | 41 | 40 |
| Angel's Landing | 23 Oct '98 | 43 – 51 | 45 | 52% | 45 | 44 |
| East Mesa | 19 Oct '98 | 27 – 52 | 37 | 65% | 35 | 30 |
| Tabernacle Dome | 15 Oct '98 | 23 – 43 | 32 | 37% | 29 | 26 |
| Tabernacle Dome | 16 Oct '98 | 29 – 57 | 47 | 44% | 43 | 36 |
| Watchman | 15 Oct '98 | 35 – 45 | 40 | 77% | 40 | 38 |
| Watchman | 22 Oct '98 | 31 – 51 | 37 | 31% | 35 | 32 |

affecting audibility are the frequency-based sound levels of both the particular noise source and the ambient or “background” sound. Even in the presence of a very “loud” natural ambient sound source, such as a waterfall, a noise source with a much lower single decibel value may be clearly audible because it has higher energy levels than the ambient sound in a specific part of its frequency spectrum. The difference between the energy level of the noise source and the background sound (in this case, the natural ambient sound) in each of the many distinct frequency bands is what determines whether and how much the noise source will be audible. For these reasons, single decibel values provide useful comparisons of average total sound energy, but they do not relate well to audibility.

It also should be noted that the wind likely increased the ambient sound levels during many of the measurement periods. Lower ambient values probably would be recorded during times of less wind.

The measured range of one-hour Leq values is shown on table 8 for each site and date when measurements were taken. The one-hour Leq, or equivalent noise level, is the “energy average” noise level over a one-hour sampling period — it is the single A-weighted decibel value equivalent to the same amount of sound energy generated by the fluctuating natural sound levels during the one-hour period. Leq is a cumulative metric; that is, it keeps getting bigger as more energy is added during the time period. It is useful for relative comparisons of “average” conditions over long time

periods, but the Leq provides little information concerning the sound environment an individual visitor might experience during a short visit (i.e., a few hours to a few days) to the park

The L_{50} is the median value of all the ambient levels measured, and the L_{90} is the natural ambient level exceeded 90% of the time by other natural sounds. The L_{90} can be considered a single number approximation of a park's natural ambient sound conditions. The lower the dBA number, the “quieter” the soundscape.

Although table 8 provides limited observations, the data are believed to be representative of Zion's natural soundscape. Zion National Park is generally a very quiet area compared to most places where park visitors reside. The opportunity to experience Zion's natural soundscape unimpaired by the sounds of human civilization is an important part of the overall visitor experience, especially as it contributes to the solitude and wilderness experience that is integral to much of the park.

An additional factor to consider in determining the impacts on the soundscape resource of the park is the relative audibility of unwanted sounds, or noise. Annoyance from human sound sources, such as cars, buses, audio devices, generators, aircraft overflights, and peoples' voices, can adversely impact any natural soundscape. In very low-ambient-level natural soundscapes, like Zion, noise can be much more audible, thereby having greater impacts than would the same levels of noise in areas of higher-ambient-level soundscapes, such as urban environments.

VISITOR USE

VISITOR ACTIVITIES AND EXPERIENCES

For many visitors, a visit to Zion is a stop on a visit to “the Grand Circle,” a region of spectacular scenery and diverse recreational opportunities including several national parks, national forests, state park areas, and Indian reservations in northern Arizona and southern Utah. Most visitors (66%) spend less than a full day at Zion National Park.

Range of Visitor Activities and Experiences

Zion’s spectacular scenery attracts people to both Zion Canyon and the Kolob Canyons. Both areas offer a variety of recreational opportunities and activities. The primary visitor activities in both areas include driving scenic roads, stopping at pulloffs, taking photographs, and taking short hikes. A typical visit to Zion includes a few hours spent in Zion Canyon, a stop at the visitor center, and a short hike on one of the trails in Zion Canyon. The 1992 visitor survey found the most common visitor activities at Zion were photography and painting or drawing (88% of total groups), stopping at scenic pullouts (87%), hiking less than two hours (50%), hiking more than two hours (29%), picnicking (28%), tubing or wading in the river (23%), and camping in a developed campground (20%). Ranger-led talks were attended by six percent of the groups responding to the survey and two percent of the responding groups attended a ranger-led walk. Visitor groups often participated in more than one activity.

While the majority of visitors do not participate in backcountry camping, canyoneering, horseback riding, or climbing, some visitors go to Zion specifically to participate in these activities. The park’s

Terms and Caveats

The term “visitor experience” refers to everything that happens to visitors while visiting Zion — everything they do, learn, feel, and perceive.

Information on visitor activities and experiences comes from staff observations and from two visitor surveys. A Visitor Services Project Visitor Survey (Littlejohn 1993) was conducted at Zion National Park during July 12 to 18, 1992. (This study is hereafter referred to as the 1992 visitor survey.) The Zion National Park Visitor Utilization Study (Shacklett 1995) collected data from August 26 to 28, 1994. (This study is hereafter referred to as the 1994 study.) Both studies were conducted under short time frames and involved small numbers of visitors (i.e., a total of 647 questionnaires were distributed and 528 were returned). Thus, the results may not be truly indicative of visitor activities and experiences.

natural resources offer hiking experiences ranging from easy nature walks to moderate day hikes to strenuous multi-day backpacking opportunities, and a variety of climbing and canyoneering opportunities. Horseback riding is allowed on certain trails in the park and a concessioner provides guided horseback rides on the Sand Bench trail during the summer. Bicycling is restricted at Zion to the Pa’rus trail and paved roads. Other park activities include kayaking, picnicking, and swimming.

No commercially guided activities are permitted in the park. Park personnel provide short guided hikes in the main canyon and offer programs at the visitor center and campground through the summer season.

Visitation and backcountry use have been increasing at Zion National Park (see the following section on visitor use). This increase could be affecting the experiences of some visitors, although there is little data about the expectations of Zion visitors that would determine their perception of crowding or their actual

experiences. Park staff have received comments indicating that some visitors feel that Zion is too crowded in certain areas and at certain times and that it is too difficult to experience solitude and quiet. The 1992 visitor survey found that 37% of visitors felt crowded in the park. The 1994 visitor study found that although visitors had serious concerns about parking and crowding, these concerns had a minimal impact upon the impressions of their experience. Apparently, some people do not seem to be bothered by the increased visitation.

The way that visitors experience Zion will change dramatically in the year 2000 when a shuttle system in Zion Canyon becomes operational (see below). While the shuttle will directly affect the way visitors experience Zion Canyon, it could also cause a redistribution of visitation within the whole park. For example, visitors who wish to access the park in their vehicles or visitors who do not have the time or inclination to use the shuttle may choose to visit the Kolob Canyon area, the Kolob-Terrace Road, or areas along the Zion-Mount Carmel Highway instead of or in addition to Zion Canyon. This could result in more visitation and possibly more crowding in those areas.

South Entrance and Main Zion Canyon Area

Zion Canyon is by far the most visited area of Zion National Park. The 1994 visitor study and the 1992 visitor survey found that the following percentages of Zion visitors went to these locations in Zion Canyon: Zion Canyon Road (76%), Zion Canyon visitor center (64-73%), Temple of Sinawava (39-57%), Zion Lodge (46-54%), the Riverside walk (47%), and the West Rim trail (41%). During the peak season, visitors often can not visit some of the main attractions and trails in Zion Canyon because they can not find parking.

Approximately two-thirds of visitors in private vehicles and one-third of the visitors arriving in tour buses access Zion Canyon through the park's south entrance. Once in Zion Canyon, most visitors drive part or all of the road, stop at the visitor center and the lodge, and perhaps take a short hike. The North Fork of the Virgin River is another of Zion Canyon's major visitor attractions. Thousands of visitors come to the river to cool off, swim, wade, or walk along the river. Some kayaking in the Virgin River occurs during spring runoff.

Visitors can stay overnight in Zion Canyon at the Zion Canyon Lodge or camp at one of two frontcountry campgrounds near the south entrance to the park. Some visitors consider an overnight stay in the park to be an integral part of their Zion experience. The lodge has been in operation for more than 80 years, and provides overnight accommodations, food services, and a gift shop. The lodge and the campgrounds are usually full during peak season. Picnicking is available in Zion Canyon at the Grotto.

As noted above, the way visitors experience Zion Canyon will change dramatically when the shuttles start operating. During the peak season, and eventually year-round, visitors will park their vehicles at the south entrance to the park and use shuttle buses to travel around the canyon. Lodge guests will continue to be able to use their private vehicles to access the lodge. A new transportation center, including a parking area, restrooms, interpretive exhibits, backcountry permit area, and a book sale area, will provide visitors with an overview of park themes and help them plan their visit. The current visitor center will become a museum focusing on the park's human history. Several other new facilities will be constructed to support the shuttle system including a new bus maintenance area in Sammy's Canyon, and several pullouts, trailheads with parking lots, shuttle stops along the Zion Canyon road, and an emergency service facility.

The *Zion Canyon Transportation System Environmental Assessment* and "Finding of No Significant Impact" (NPS 1997b) analyzed the impact of the transportation system on the visitor experience. The shuttle's effect on visitor experience will largely depend on how the shuttle system operates and on visitor expectations and values. Park managers believe that the shuttle system will improve the visitor experience, reduce crowding, and improve opportunities for interpretation. It is anticipated that reduced traffic will provide a more leisurely and safe visit to Zion Canyon with less noise and traffic. Some visitors may find the less crowded and quieter condition more appealing. For example, visitors will have a chance to stop at the major attractions of the canyon without having to compete for parking places.

On the other hand, some visitors may not be bothered by or may even prefer having many people around. The shuttle system will make the Zion Canyon visitor experience more structured, eliminating the opportunity for unprogrammed sightseeing stops. Visitors will no longer be able to experience the freedom of movement associated with the use of a personal vehicle.

East Entrance and the Zion-Mt. Carmel Highway Area

Approximately one-third of visitors in private cars and two-thirds of visitors in tour buses enter Zion through the east entrance. The 1994 visitor study found that 65% of park visitors visited the Zion-Mt. Carmel Highway and 48% of park visitors stopped at Checkerboard Mesa. Visitation to sites along the Zion-Mt. Carmel Highway is expected to increase once the Zion Canyon shuttles are operating.

There are minimal visitor facilities at the east entrance and along the Zion-Mt. Carmel Highway — the only facilities are pullouts, trailheads, a picnic area, and the entrance

Definitions of Recreational Use Terms

Recreation visits are the entries of persons, for any part of a day, onto lands or waters administered by the National Park Service for recreation purposes.

Nonrecreation visits include persons going to and from inholdings; commuter and other through traffic; trades people doing jobs within the park; any civilian activity a part of or incidental to the pursuit of a gainful occupation (e.g. guides); government personnel (other than NPS employees) with business within the park; citizens using NPS buildings for civic or other local government business or attending public meetings; and outside research activities if independent of NPS legislated interests (e.g. meteorological research).

Beginning in 1993, nonrecreation visitor use was calculated at a fixed rate of 60 nonrecreation visits per day. This adjustment was made due to a review and revision of the official counting and reporting instructions for the park.

Total visits equals recreation visits plus nonrecreation visits.

station. During the peak season there can be considerable congestion and crowding of vehicles at the tunnel.

Kolob Canyons Road Area

This area provides an opportunity for visitors to experience beautiful scenery from their vehicle or on foot without the crowds typically experienced in Zion Canyon. A five-mile scenic drive begins behind the small visitor center. Parking lots and trailheads along the road provide access to the Middle and South Forks of Taylor Creek, the La Verkin/Kolob Arch trail, and the Timber Creek overlook and picnic area.

The 1992 visitor survey found that 19% of Zion visitors went to the Kolob Canyons area. Visitation to this area tripled between 1984 and 1995 according to park statistics. Visitation may increase in the Kolob Canyons area once the Zion Canyon shuttles begin

operating. According to the 1992 visitor survey, the most common activities in the area were driving the scenic road (91%), visiting the Kolob Canyons visitor center (64%), using the restrooms (61%), getting information (54%), and hiking (28%).

The Kolob-Terrace Road Area

The Kolob-Terrace Road provides a scenic drive for visitors who want to get off the beaten path. Because the road has minimal traffic, this area provides a more rustic experience. It also provides access to trailheads serving the Hop Valley, Wildcat Canyon, Connector, Left Fork, and Grapevine trails, thus providing opportunities for hiking and canyoneering in these areas. The road also provides access to the Lava Point campground.

Lava Point Area

Lava Point provides opportunities for primitive camping in a smaller more rustic campground than the campgrounds in Zion Canyon. It is used primarily by small groups of tent campers and is a popular destination for local residents. During the summer, the campground is full every night. A small picnic area is located at Lava Point. The 1992 visitor survey found that 3% of park visitors went to Lava Point

Proposed Wilderness

Most visitors do not stay overnight in the park and do not enter the Zion backcountry. However, some visitors come to Zion specifically to experience the Zion wilderness, seeking out opportunities to backpack, climb, horseback ride, and explore canyons. With the exceptions of the Narrows, the Left Fork of North Creek, the West Rim, and the Kolob area, and several areas where horses and pack animals are restricted, visitors can generally experience

the Zion backcountry without limits on where they can camp. But as backcountry use at Zion grows, visitor expectations regarding solitude may not always be met in some areas due to the number of other visitors.

SCENIC RESOURCES

For many visitors, enjoying the views of Zion's spectacular scenery without signs of modern development is part of a quality experience. Several park facilities — notably the visitor centers in Zion Canyon and in the Kolob Canyons district, the campgrounds, the roads, Zion Canyon Lodge, radio repeaters, and park housing — affect the visitor's ability to experience scenic resources.

Besides facilities within the park, developments on private land outside the park have the potential to affect the views from Zion, and therefore the experiences of Zion visitors. Currently, the modern development outside the park that is visible from within the park is limited. Several notable exceptions include the town of Springdale, Highway 9 and developments along the road corridor, and Interstate 15. As population and development around Zion continue to increase, visual intrusions outside the park will likely increase.

ANNUAL AND MONTHLY VISITOR USE

Zion is open all year. The peak-use season runs from April through October, with the pattern of monthly visitor use stair stepping up and down on an annual basis. In 1997, more than 82.5 % of the annual visitation occurred during the peak season. During August, the busiest month, park staff recorded an average of 11,839 recreational visits each day. In contrast, during December, daily visitor use averaged only 1,941 recreational visits. Nonrecreational use is reported as a constant 60 visits per day.

From 1986 through 1993, visitor use at the park, measured as recreational visits, rose each year (figure 1). The increases ranged from 0.17% to 8.76% per year, with the average increase being 4.71%. In 1992, park staff made several modifications to the counting and reporting procedures to make them consistent with accepted NPS standards. In addition to setting nonrecreational use at a fixed figure per day, the persons-per-vehicle multipliers were reduced somewhat. These changes resulted in a dramatic reduction in the amount of nonrecreational visits reported for the park. Park staff also recorded a corresponding reduction in the total number of visits. The changes did not significantly affect the annual amount of recreational use reported, however. Although the number of recreational visits declined from 1993 to 1994, the change in visits from 1993 to 1997 averaged a positive 0.92%.

OVERNIGHT VISITOR USE

Park staff measure overnight visitor use of the park as *overnight stays*. An overnight stay is considered to be one visitor spending one night within the park for recreational purposes. Table 9 lists overnight stays in the park from 1986 through 1997; table 10 details monthly overnight use for 1997. Overnight stays are counted separately from recreational visits, so they do not directly correspond to recreational visits.

The determination of overnight use is also based on the official NPS counting and reporting procedures for Zion National Park, which include the use of various multipliers to calculate some types of overnight use, such as tent, RV, and backcountry camping and concessioner lodging. The decline in overnight use from 1992 to 1993 was mostly the result of the changes that were made to Zion's counting and reporting instructions by the NPS Public Use Statistics Program Center. Two more years of decline followed and then, in 1996, an increase in total overnight stays was reported. In 1997 overnight stays again declined, but by less than 4%.

Compared to the amount of recreational visits (2,445,534 in 1997), it is readily apparent that overnight use of the park (272,492 overnight stays in 1997) accounted for only a small portion of the park's recreational use.

Overnight stays follow the same annual pattern as recreational visits. Relatively little overnight use occurs in the winter. Increased overnight use begins in March and stays relatively high from April through October.

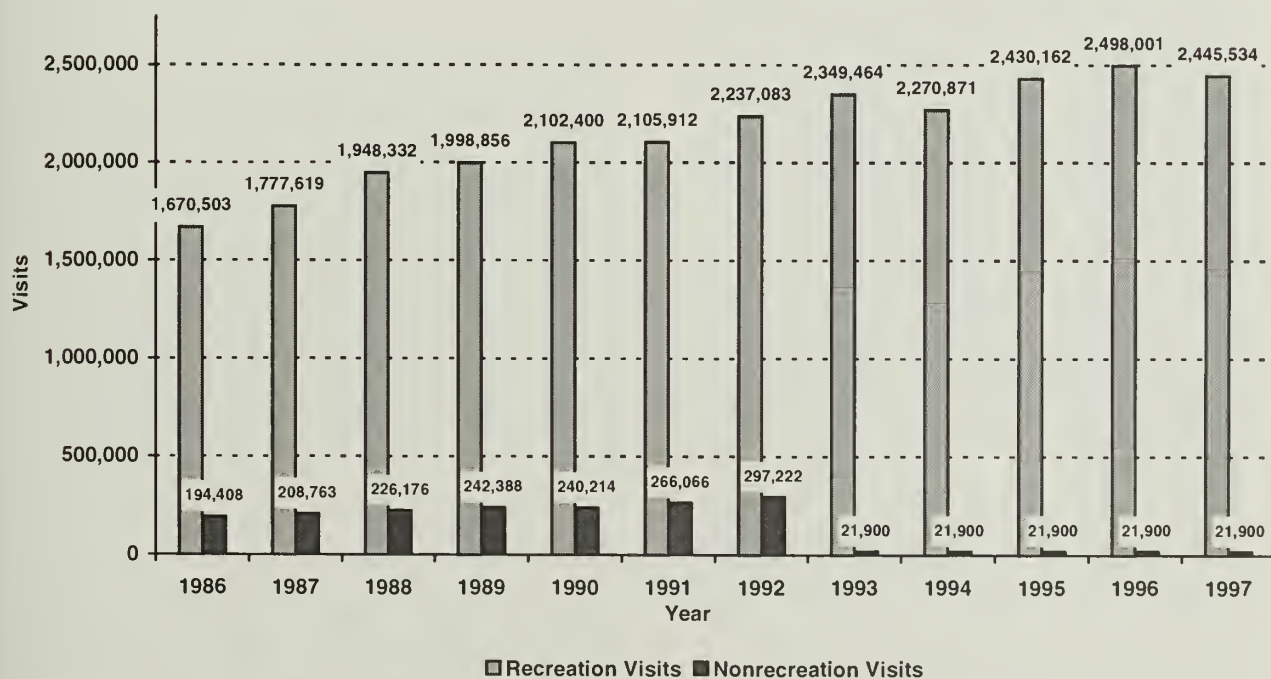
The frontcountry areas of the park provide developed facilities for overnight use. Zion Lodge has 40 cabins and 81 motel rooms available for the public. It is usually filled to near capacity during the summer. The lodge receives relatively low levels of use during the winter.

TABLE 9: OVERNIGHT STAYS, 1986–1997

| Year | Park Tent Camping | Park RV Camping | Park Backcountry Camping | Concessioner Lodging | Total Overnight Stays | % Change from Previous Year |
|------|-------------------|-----------------|--------------------------|----------------------|-----------------------|-----------------------------|
| 1997 | 111,610 | 54,684 | 19,237 | 73,603 | 245,776 | -8.6% |
| 1996 | 121,650 | 61,884 | 18,384 | 67,096 | 269,014 | 3.7% |
| 1995 | 110,206 | 66,254 | 20,138 | 62,869 | 259,467 | -3.2% |
| 1994 | 116,600 | 62,719 | 14,425 | 74,439 | 268,183 | -2.2% |
| 1993 | 116,596 | 75,447 | 15,394 | 66,720 | 274,157 | -13.0% |
| 1992 | 139,763 | 97,017 | 14,726 | 63,780 | 315,286 | 2.0% |
| 1991 | 130,285 | 101,314 | 13,140 | 64,251 | 308,990 | 11.1% |
| 1990 | 117,157 | 97,276 | 10,910 | 52,717 | 278,060 | 0.2% |
| 1989 | 113,034 | 97,344 | 10,620 | 56,619 | 277,617 | 1.2% |
| 1988 | 112,451 | 100,441 | 7,538 | 53,894 | 274,324 | 10.6% |
| 1987 | 91,911 | 98,116 | 7,707 | 50,324 | 248,058 | 10.2% |
| 1986 | 88,084 | 82,649 | 7,807 | 46,640 | 225,180 | |

Source: National Park Service, Public Use Statistics Program Center.

Figure 1. Annual Recreation and Nonrecreation Use, 1986 to 1997



Source: National Park Service, Public Use Statistics Program Center

TABLE 10: OVERNIGHT STAYS FOR 1997

| Month | Park Tent Camping | Park RV Camping | Park Backcountry Camping | Concessioner Lodging | Total Overnight Stays |
|--------------|----------------------|--------------------|--------------------------------|-------------------------|-----------------------------|
| January | 773 | 336 | 116 | 2,162 | 3,387 |
| February | 918 | 637 | 230 | 2,692 | 4,477 |
| March | 3,613 | 2,138 | 3,084 | 5,234 | 14,069 |
| April | 9,558 | 6,680 | 1,403 | 6,564 | 24,205 |
| May | 11,314 | 6,668 | 3,533 | 6,574 | 28,089 |
| June | 17,836 | 8,505 | 1,114 | 9,899 | 37,354 |
| July | 19,032 | 6,037 | 1,041 | 8,786 | 34,896 |
| August | 18,925 | 6,339 | 1,374 | 9,168 | 35,806 |
| September | 15,696 | 7,618 | 1,213 | 9,208 | 33,735 |
| October | 9,888 | 6,856 | 4,356 | 6,974 | 28,074 |
| November | 3,008 | 2,539 | 1,410 | 4,011 | 10,968 |
| December | 1,049 | 331 | 363 | 2,331 | 4,074 |
| Total | 111,610 | 54,684 | 19,237 | 73,603 | 259,134 |

Source: National Park Service, Public Use Statistics Program Center.

The Watchman and South campgrounds, both of which are near the south entrance to the park, offer recreational vehicle and tent camping (228 and 128 sites, respectively). These facilities provide fire grates, picnic tables, water, restrooms, and a sanitary dump station for trailers. Loop D of the Watchman campground also has electrical hookups. Showers are not available in either facility. Watchman campground is open year round, while South campground is open only in the summer. Group camping is available by reservation for groups of 9 to 40 people. There are 7 group sites with a total capacity of 200 people. Camping in the frontcountry is limited to designated sites and to a maximum of 14 days at one site.

There is a primitive campground with six sites at Lava Point. Open from May to October, this campground has fire grates, tables, and toilets but no water.

Backpacking and camping in the backcountry is available throughout the park. There are no designated campsites (except in the Narrows, along the La Verkin Creek/Hop Valley trails,

and along the West Rim trail) and no facilities are provided. Camping in the backcountry is also limited to 14 days at one site.

VISITOR USE PROFILE

A scientifically valid and reliable visitor profile is not currently available for Zion. However, some insights into a profile for park's visitors are available from the 1992 visitor survey conducted during July 12 to 18 (Littlejohn 1993). As noted previously, the small population size, the short time frame during which data were collected, and a lack of a representative sample of the primary visitor season (April through October), limit the conclusions that can be drawn about the general visitor population. Nevertheless, this is the best data available.

The results of the survey were that 67% of the respondents indicated that they were visiting the park as a family group. Group size was usually two (43% of respondents) or four (22% of respondents). About one-third (32%) of respondents were between 36 and 50 years

old; 22% were 15 years old or younger. Most of the respondents (69%) were first time visitors to the park.

U.S. visitors came from 44 states plus the District of Columbia and Puerto Rico. California provided 24% of the visitors, while Utah provided 13% ; Nevada, 7%; and Arizona, 5%.

Visitors from foreign countries made up 21% of the total number of visitors responding to the 1992 survey. The highest percentages of foreign visitors were from Germany (38%), the Netherlands (13%), France (12%), and Switzerland (9%).

Regarding length-of-stay, two-thirds of the visitor groups surveyed were day-use visitors and spent less than one day in the park. Of these visitors, 22% were in the park for less than two hours, 35% spent three to four hours in the park, and 44% stayed five or more hours. One-third of the visitor groups stayed for one to four days. Less than 1% stayed for five or more days.

Another source of visitor demographics is the 1994 visitor study (Shacklett 1995). Again, the short time frame for data collection (August 26 through August 28, 1994) and the lack of a representative sample limit the applicability of this study's results — the data collected allow inferences to be made about the study period only. However, the 433 surveys that were collected from visitors to both Zion and Kolob Canyons provide some information on who visited the park during the brief survey period.

This survey indicates that 24% of the visitors were with family groups, whereas the rest (76%) were unrelated adults. The average group size was 2.9 persons. Respondents were equally divided between first time visitors and repeat visitors.

The visitors responding to the survey came from west of the Mississippi (48% of the

total), east of the Mississippi (25%) and from foreign countries (27%). Respondents indicated that they had or were planning to spend an average of 1.8 days visiting the park. The average length of stay was 3.4 hours for visitors who stopped within the park (87% of survey respondents) and only 42 minutes for those who simply drove through the park (13%).

PROJECTIONS OF POTENTIAL VISITOR USE

Park use is affected by a variety of factors. Forecasted use for Zion was based solely on past use, which was then projected forward over time. This method implies that whatever factors influenced visitation in the past will continue to do so in the future, and that any changes in those factors will follow historic patterns. The extrapolation of a past trend only forecasts a trend pattern, not the causes of the trend.

It is assumed that visitation to Zion National Park, if unmanaged, would increase over the long term; since this seems to be the general trend for most units within the national park system. The Park Service developed a forecast using a simple straight line projection based on two different historic trends. The forecast uses growth factors of 1%, 3%, and 5% to derive the low, medium, and high estimates of recreational visits. These rates of growth are based on historic growth observed prior to and after 1993. From 1986 to 1993 the average increase in recreational visits to the park was approximately 5%. Then after a change in the counting and reporting procedures in 1993, the average rate of growth was about 1%, even with a reported decline in visitation from 1993 to 1994. A middle ground rate for 1986 to 1996 approximates 3%. These growth factor rates provide a range of projected visitation figures that is considered reasonable over the next few years. The further out in time one projects, the greater the range between the

high and low projections and the less reliability that can be ascribed to them.

Forecasting in this manner is subject to a high probability of error because the method used is simplistic, relatively little data are available, and there is no cause and effect relationship between past use and future use. The addition of another year's visitation figures (additional data) may affect the projections. For these reasons, a range of values was reported and caution is warranted when interpreting and using the results.

Table 11 and figure 2 present the projected visitation figures. At the high rate of growth of 5%, compounded annually, visitor use of the park would double in about 15 years. The medium growth rate of 3% projects an additional 500,000 recreational visits in 5 years and an increase of more than 1,200,000 recreational visits in 10 years. Such high levels of visitation could only be accommodated within the park through significant changes in park management. It is expected that managed visitation would reach a plateau, with some fluctuation, and then level off. In

all likelihood, it would become necessary to manage visitor use at a level that is sustainable both in terms of protecting the resource and providing quality visitor experiences. Uncontrolled growth in visitor use would have serious negative impacts on the resources of the park and the quality of the visitor experience.

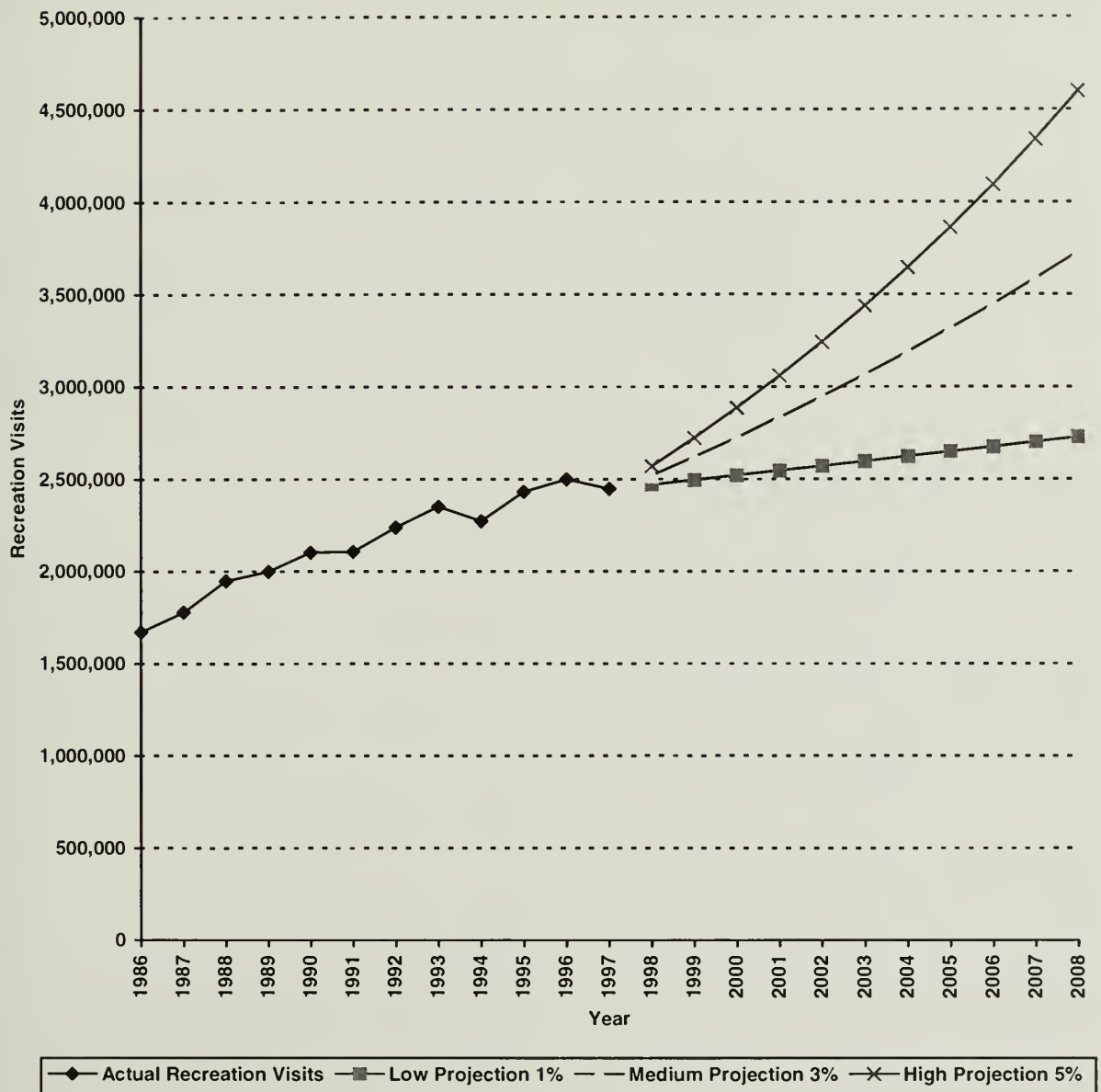
The human element contributes to the difficulty in projecting future recreational use. That is, visitor use patterns could change in response to the actions presented in the alternatives. For instance, as a response to either carrying capacity limits or crowded conditions during the peak season, some visitors could choose to visit the park during the shoulder seasons rather than during the summer. Alternatively, weekdays could become as popular as weekends during the peak use season. So even though limits on visitor use on any particular day could be established increases in overall visitor use of the park are still possible.

TABLE 11: POTENTIAL RECREATIONAL USE, 1998–2008

| Year | Projected Recreational Visits | | |
|------|-------------------------------|-------------|-----------|
| | Low (1%) | Medium (3%) | High (5%) |
| 2008 | 2,728,000 | 3,729,000 | 4,599,000 |
| 2007 | 2,701,000 | 3,585,000 | 4,338,000 |
| 2006 | 2,675,000 | 3,447,000 | 4,093,000 |
| 2005 | 2,648,000 | 3,315,000 | 3,861,000 |
| 2004 | 2,622,000 | 3,187,000 | 3,642,000 |
| 2003 | 2,596,000 | 3,065,000 | 3,436,000 |
| 2002 | 2,570,000 | 2,947,000 | 3,242,000 |
| 2001 | 2,545,000 | 2,833,000 | 3,058,000 |
| 2000 | 2,520,000 | 2,724,000 | 2,885,000 |
| 1999 | 2,495,000 | 2,620,000 | 2,722,000 |
| 1998 | 2,470,000 | 2,519,000 | 2,568,000 |

Source: National Park Service, Denver Service Center, Resource Planning.

Figure 2: Actual and Projected Recreational Use, 1986 to 2008



Source: National Park Service, Public Use Statistics Program Center, and Denver Service Center, Resource Planning.

OTHER RECREATIONAL FACILITIES ADJACENT TO THE PARK

Southwestern Utah has numerous and diverse outdoor recreational opportunities. Various government land agencies manage large recreational areas within a few hours drive of Zion. Varied topography and ecosystems, as well as extraordinary scenic qualities make this region attractive to tourists and outdoor recreation enthusiasts from all over the country. The following section briefly describes major recreational areas of the region.

National Park Service

Capitol Reef National Park, 204 miles from Zion, is named for the reef-like cliffs capped by white sandstone formations resembling the U.S. Capitol. The park protects a portion of the Waterpocket Fold in addition to petroglyphs and the remains of an early Mormon pioneer settlement. Capitol Reef offers opportunities for hiking, horseback riding, camping, ranger-guided activities, scenic drives, and nature study.

Bryce Canyon National Park is located 86 miles from Zion. It includes some of the earth's most colorful rocks, sculpted by erosion into fantastic forms. Recreational activities include scenic drives, hiking, camping, ranger-guided activities, guided horseback riding tours, and nature study.

Cedar Breaks National Monument is 76 miles northeast of Zion. This monument encompasses a multicolored limestone amphitheater eroded to depths of nearly 2,500 feet. Hiking, camping, and picnicking are popular activities. The road through the monument is not open during the winter.

Pipe Spring National Monument is located 63 miles south of the park on the Kaibab-Paiute Indian Reservation in Arizona. A fort, built in the 1870s by Mormon pioneers, laid claim to

one of the few natural springs in the area. The fort, several ranch buildings, living history demonstrations, and an interpretive trail offer a glimpse of American Indian and pioneer life in the Old West.

Bureau of Land Management

Grand Staircase of the Escalante National Monument, established in 1996, encompasses 1.7 million acres in southwestern Utah. The majority of the monument is rugged, remote, and undeveloped. Opportunities exist for hiking, camping, backpacking, mountain biking, and horseback riding. Guided activities include horseback riding, hiking, mountain biking, fishing and hunting trips.

U.S. Forest Service

Dixie National Forest covers 1,900,000 acres in southwestern Utah. Recreational opportunities include camping, hiking, fishing, hunting, viewing scenery, horseback riding, studying nature, picnicking, snowmobiling, and participating in water-based activities. A total of 83,000 acres of the forest are designated wilderness.

State of Utah

Iron Mission State Park, approximately 60 miles north of Zion, provides a glimpse of what life was like for pioneers working an iron mine during the 1850s. The park's museum houses a collection of wagons, machinery, pioneer tools, and housewares as well as a collection of Southern Paiute clothing and tools. The park has facilities for picnicking.

Gunlock State Park, located 57 miles west of Zion, offers opportunities for year-round water sports, boating, and fishing.

Snow Canyon State Park, located 51 miles west of Zion, protects unique and scenic

geological features such as volcanic cones, sand dunes, sandstone cliffs, and lava caves. It provides opportunities for hiking, horseback riding, bicycling, and camping.

Coral Pink Sand Dunes State Park, located 36 miles southeast of Zion, is a wide-sweeping expanse of coral-colored sand. The park provides opportunities for picnicking, hiking, off-highway vehicle use, and camping.

SOCIOECONOMIC ENVIRONMENT

Zion National Park is in eastern Washington County, western Kane County, and eastern Iron County. Washington and Kane Counties are most closely linked economically (via tourism) to Zion National Park because the eastern and southern access points to the main visitor use areas of the park (Zion Canyon and the Zion-Mt. Carmel Highway) are located in these counties.

POPULATION

Between 1980 and 1990 the United States' population grew by approximately 9.8%, and from 1990 through 1995, by more than 5.4%. During these same time periods, the population of Utah grew at nearly double the national rates. An important characteristic of the three-county region within which Zion is situated has been its impressive growth. Since 1980, the three counties have experienced even higher population growth rates than either the state and national averages.

Specifically, Washington County, containing the city of St. George and most of Zion National Park, has experienced tremendous growth, expanding by more than 42,000 people (nearly 160%) in just 15 years — 1980 to 1995 (Bureau of Economic Analysis 1997). Most of this growth has centered on the St. George area of the county: the city has expanded by approximately 11,000 people from 1990 to 1994 (St. George Area Chamber of Commerce 1996). The mild climate, community facilities and services, and proximity to several national parks and other public lands offering a wide variety of outdoor recreational opportunities have all contributed to the area's growth. The St. George area has been known as a retirement destination, but in recent years the area has attracted many new businesses and job seekers including young families.

ECONOMY

The primary economic sectors in terms of earnings are identified in table 12. Tourism is separated among services (such as lodging and restaurants) and retail trade (e.g., souvenir stores). The jobs provided by the service sector, especially tourism, typically are not high paying. Tourism also tends to be highly seasonal in nature. So while tourism may be an important aspect of the local economy in terms of total earnings and number of jobs, many individuals employed in this economic sector may not be particularly well off.

TRANSPORTATION/ACCESS

Zion National Park is one of the many destination parks located in southern Utah and northern Arizona far from the major population centers of the country. However, tens of thousands of domestic and foreign visitors are undaunted by these distances and arrive by various types of motor vehicles every year. Interstate 15, running north to south, is the major highway connecting the southwestern corner of Utah with the rest of the nation. Via this route, Zion National Park is 42 miles from St. George, and St. George is connected with Salt Lake City to the north and Las Vegas, Nevada, to the south. Interstate 15 also intersects Interstate 70 about 125 miles north of St. George, which in turn connects with Denver, Colorado, to the east. Access to the Kolob Canyons area of the park is directly off of Interstate 15. To get to the southern entrance of the park, visitors take Interstate 15 through St. George to Utah Route 9 and drive 42 miles to Springdale. To reach the eastern entrance of the park, visitors use Utah Routes 89 and 9 via Panguitch or Kanab.

TABLE 12: TOP THREE INDUSTRIES IN TERMS OF EARNINGS IN 1995

| Primary Economic Sectors in Terms of Earnings in 1995 | | | | |
|---|--|--|--|----------------------------------|
| | Industry and Percent of Total Earnings | Industry and Percent of Total Earnings | Industry and Percent of Total Earnings | Total Earnings (Thousands of \$) |
| State of Utah | Services (26.9%) | State and Local Government (11.8%) | Durable Goods Manufacturing (11.1%) | \$27,615,561 |
| Iron County | Services (23.3%) | State and Local Government (21.9%) | Retail Trade (13.9%) | \$257,706 |
| Kane County | Services (33.0%) | Retail Trade (19.4%) | State and Local Government (19.4%) | \$49,881 |
| Washington County | Services (28.2%) | Retail Trade (18.0%) | Construction (16.8%) | \$702,990 |

Source: Bureau of Economic Analysis, Regional Economic Information System, Economics and Statistics Administration, U.S. Department of Commerce, 1995 data.

VISITOR SERVICES

Beaver, Cedar City, Kanab, Panguitch, St. George, and Springdale in southwest Utah have a variety of restaurants, motels, souvenir shops, and other retail establishments offering goods and services to the traveling public. The abundance of lodging facilities, including campgrounds, as well as eating establishments in southwestern Utah attest to the importance of tourism in the region. Automotive services, medical services, and other visitor services are available in some communities.

Rockville and Springdale serve as the southern gateway to the most heavily used areas of Zion. Springdale, with approximately 300 permanent residents, is adjacent to the park entrance. Fourteen motels, lodges, and inns, and eleven bed and breakfast establishments are located within Rockville and Springdale. The lodging facilities range from small bed and breakfasts with two to five units, to a lodge that offers 120 units. Nearly 500 lodging units are available to the public. In addition, there is a privately owned campground (open to the public) in Springdale. A dozen restaurants were open in Springdale in 1998.

The local (Zion Canyon) economy is based on tourism, ranching, fruit production, and the arts. Springdale has a chamber of commerce

(Zion Canyon Chamber of Commerce), a medical clinic, and a town office. In addition to lodging and food establishments, there are many shops and galleries offering souvenirs and a variety of crafts and original art.

Access to the east entrance of the park is through Kane County. Near this entrance, at Mt. Carmel Junction, three motels, two campgrounds, and a restaurant provide lodging and food services for visitors arriving via Utah Routes 89 and 9. Fewer visitors make use of the east entrance of the park as compared to the south entrance.

Southeast of the park, 17 miles from Mt. Carmel Junction, is Kanab — the largest town in Kane County, with a 1990 population of 3,289. Kanab is the county seat and serves as a recreational and commercial center for Kane County and the Arizona strip. A BLM visitor information center is located here. A range of commercial services, including lodging, automotive services, restaurants, and several local tourist attractions featuring Old West and Hollywood movie themes, is found in Kanab. The town has about two dozen lodging establishments and over twenty restaurants.

Cedar City is about 18 miles north of the Kolob Canyons entrance to the park. This city had a population of 13,443 in 1990. A wide

variety of services are available in Cedar City — 20 lodging establishments, 7 campgrounds, and close to 40 restaurants serve the public. Cedar City also has a visitor center and automotive and medical services.

REGIONAL LANDOWNERSHIP AND USE

Zion National Park is surrounded by a mix of federal, state, and privately owned lands. The Bureau of Land Management manages national resource lands that lie along almost 57% of the park's boundary. State owned school lands are found next to slightly less than 8.5% of Zion's border. Privately owned lands surround approximately 34.5% of the park. The lands bordering the park are used for a variety of purposes, including grazing and ranching, recreation, private residences, and commercial uses.

Table 13 indicates the general land ownership patterns of the three counties in which the park is located. A large area of each of these three counties is publicly owned, with the federal government managing the largest portions of each county. The Bureau of Land Management, U.S. Forest Service, National Park

Service, and Bureau of Indian Affairs (Shivwits Indian Reservation) all manage federal lands within this three-county area. The state of Utah owns and manages numerous school section parcels throughout these counties. In addition, six state parks are located in the area. The amount of area in private ownership ranges from approximately one-third in Iron County to less than one-twentieth in Kane County.

The land within this corner of Utah is used for a variety of purposes including, but not limited to, agriculture (i.e., farming, orchards, ranching, livestock grazing), mineral exploration and production (including coal, oil, and natural gas production), outdoor recreation of all types, timber production, watershed protection, wilderness, transportation (including roads, powerlines, and pipelines), wildlife and fish habitat, and urban and commercial uses. While traditional uses such as grazing, mining, and forest products are still important to the area's economy, other uses that are tied to the land — especially outdoor recreation and tourism — are growing in importance. The relatively mild climate and varied and abundant recreational opportunities have encouraged the development of the region for commercial, residential, tourism and vacation, and retirement purposes.

TABLE 13: LANDOWNERSHIP IN SOUTHWEST UTAH

| | Iron County | | Kane County | | Washington County | |
|---------|--------------|--------------------------|--------------|--------------------------|-------------------|--------------------------|
| | Square Miles | Percentage of Total Area | Square Miles | Percentage of Total Area | Square Miles | Percentage of Total Area |
| Private | 1,777.07 | 35.66% | 218 | 4.99% | 412 | 17.0% |
| State | 201.57 | 6.11% | 437 | 9.99% | 121 | 5.0% |
| Federal | 1,921.99 | 58.23% | 3,718 | 85.02% | 1,892 | 78.0% |
| Total | 3,900.63 | 100% | 4,373 | 100% | 2,425 | 100% |

Source: Iron, Kane, and Washington County Governments.

ENVIRONMENTAL CONSEQUENCES



INTRODUCTION

The National Environmental Policy Act mandates that environmental impact statements disclose the environmental impacts of a proposed federal action. In this case, the proposed federal action is the implementation of the *General Management Plan* for Zion National Park.

This part of the document analyzes the potential effects of the four management alternatives on resources, the visitor experience, and the socioeconomic environment of Zion National Park. These effects provide a basis for comparing the advantages and disadvantages of the alternatives.

The alternatives in this document provide broad management directions. Because of the general, conceptual nature of their potential consequences, the alternatives can only be analyzed in general terms. Thus, this environmental impact statement should be considered a programmatic analysis. Prior to undertaking specific developments or other actions as a result of the *General Management Plan*, park managers will determine whether or not they will need to prepare more detailed environmental documents, consistent with the provisions of the National Environmental Policy Act.

The “Environmental Consequences” part first identifies the impact topics the planning team chose to analyze and discuss in this document, the topics the team chose not to discuss, and the rationale for making these selections. The impact topics were divided into the following categories:

- natural resources
- visitor uses and experiences
- socioeconomic environment

Types of Impacts

Impacts may be direct, indirect, or cumulative. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later in time or farther Removed From The Place, but are still reasonably foreseeable. Cumulative effects are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

This part next discusses the methodology the planning team used to identify impacts and includes definitions of terms. The alternatives are then analyzed in the order they appear in the “Alternatives, Including the Proposed Action.” Each impact topic includes a description of the positive and negative effects of the alternative, a discussion of the cumulative effects, if any, and a conclusion statement. For the analyses, the planning team assumed that the Park Service would take the mitigation measures described in the alternatives, such as avoiding threatened and endangered species habitats.

At the end of the discussion for each alternative, there is a brief discussion of unavoidable adverse effects, effects from short-term uses and long-term productivity, and irreversible and irretrievable commitments of resources. (Table 7, which is included at the end of “Alternatives, Including the Proposed Action,” compares and summarizes the impacts of each alternative.)

Note that aside from evaluating the cumulative impacts for certain impact topics, the planning team did not reexamine decisions and impacts the Park Service identified in the *Zion Canyon*

Intensity and Duration of Impacts

Impact intensity is the degree to which a topic is positively or negatively affected. For this environmental impact statement, the planning team qualitatively evaluated the impact intensity for all of the impact topics in the alternatives (i.e., the natural resource, visitor experience, and socioeconomic topics), using the following terms:

- *Negligible* – The impact is at the lower levels of detection
- *Minor* – The impact is slight but detectable
- *Moderate* – The impact is readily apparent
- *Major* – The impact is severely adverse or exceptionally beneficial

Impact duration refers to how long an impact would last. For the purposes of this document, the planning team used the following terms to evaluate the natural resource, visitor experience, and socioeconomic topics in the alternatives:

- *Short-term* — The impact lasts less than one year.
- *Long-term* — The impact lasts one year or more.

Transportation System Environmental Assessment (NPS 1997b) and the *Development Concept Plan / Environmental Assessment*, *Zion Canyon Headquarters* (NPS 1994b).

IMPACT TOPICS CONSIDERED IN THIS ENVIRONMENTAL IMPACT STATEMENT

To focus the environmental impact statement, the planning team selected specific impacts for further analysis and eliminated others from evaluation. A brief rationale for the selection of the topics is given below.

Natural Resource Topics

The planning team selected ten natural resource impact topics for analysis based on the major values or issues the team identified early in the planning process, as well as applicable laws and executive orders (e.g., Endangered Species Act of 1973, as amended; Executive Order 11988 (Floodplain Management)). The impact topics analyzed are as follows:

- air quality

- water quality
- North Fork of the Virgin River floodplain
- riparian/wetland communities
- hanging gardens
- microbiotic crusts
- Virgin spinedace
- Mexican spotted owl
- desert bighorn sheep

All of these resources have the potential to be appreciably affected under the alternatives evaluated. In addition, the team selected these topics because they are of special concern (e.g., Mexican spotted owl, Virgin spinedace), are sensitive to disturbance (e.g., hanging gardens, riparian communities, microbiotic soils), are of high public interest (e.g., desert bighorn sheep), or are key resources that can affect visitors and the biotic community (e.g., water and air quality, the North Fork floodplain).

Visitor Use and Experience Topics

Early in the planning process, the planning team identified visitor use and experience topics as being important values or issues to the public, as well as key elements of concern to park managers, and evaluated the uses and experiences that may be appreciably affected under the alternatives. Impact topics include visitor activities and experiences inside the park, natural sounds, and visitor experiences in other recreational areas near the park.

Socioeconomic Topics

The planning team selected the socioeconomic environment as an impact topic because the park is an important part of the local economy. Analyzing the local economic impacts provides the context for evaluating the possible impacts the alternatives may have on the local area.

IMPACT TOPICS CONSIDERED BUT NOT ANALYZED IN DETAIL

Under NPS policies and Council on Environmental Quality regulations, environmental impact statements must address a number of impact topics. However, the planning team for the *General Management Plan / Environmental Impact Statement*, dismissed several irrelevant topics as well as topics that would remain unaffected by the alternatives. The team dismissed other topics because the potential for impacts under all of the alternatives would be negligible. These topics are addressed below.

Natural Resource Topics

Regional Air Quality. Regional air quality and visibility issues would not be affected by actions in these alternatives. Air pollution from sources outside the park would be addressed through Clean Air Act authorities

and through cooperative efforts between the National Park Service and the Western Regional Air Partnership. (However, the alternatives do have the potential to result in localized impacts on air quality. Thus, localized air quality impacts were analyzed.)

Floodplains (Other than the North Fork of the Virgin River). Backcountry trails and routes in other drainage bottoms in the park would subject visitors to flooding hazards. However, most of these drainages receive little use, compared to the North Fork, and the Park Service is not proposing any new developments other than trails or routes on these floodplains. Also, NPS floodplain guidelines anticipate the use of backcountry sites and trails. Park staff would continue to emphasize public education and awareness of flood hazards to minimize potentially hazardous conditions.

Water Quantity. The Zion National Park Water Rights Settlement Agreement of 1996 is the primary tool for maintaining and protecting stream flow, spring discharge, and groundwater. As a result of this agreement, no changes in surface or groundwater flows are anticipated that will be sufficient to be detected throughout the park.

Threatened, Endangered, or Rare Species (Other than Mexican Spotted Owl). This document does not include analyses on the environmental effects that the alternatives may have on several federally listed threatened and endangered species and rare plant species.

Desert tortoise — A small population of federally threatened desert tortoises (*Gopherus agassizii*) occurs in one limited area that encompasses both park land and adjacent Bureau of Land Management (BLM) lands. The Upper Virgin River recovery plan unit for the tortoise does not encompass lands within the park, and there is no critical habitat within the park. It is not suspected that this population was introduced to the site.

Access in the general area of the tortoise population is by one minimally marked BLM trail. Visitor use is limited in the vicinity and occurs mostly in the cooler months when tortoises are underground in dens.

Under all the action alternatives, the tortoise site will be a pristine zone; no new developments will be constructed in this area. Thus, no cumulative effects are expected to occur on tortoises under any of the alternatives presented in this document.

Bald eagle — Bald eagles (*Haliaeetus leucocephalus*), a federally threatened species, winter in the vicinity of the park, especially in the Sevier River Valley east of the park. Although they are commonly observed near the Blue Reservoir to the north, only a few bald eagles are observed each year in the park during the winter and early spring months, and birds occasionally entering the park perch along the North Fork of the Virgin River. Thus, eagle use in the park is sporadic, uncommon, and unpredictable. Large congregations do not occur, and there are no known, regularly used, winter perch sites or known roost sites within the park. Given the very limited and sporadic use by eagles in the park, no effect is expected on bald eagles.

Peregrine falcon — The peregrine falcon (*Falco peregrinus anatum*) was recently delisted as a federally endangered species. The population has been gradually increasing in the park since the 1970s. Much of the park is considered to be good habitat due to the prevalence of cliffs, which the birds use for nesting.

There are 15 known peregrine territories in the park and at least 2 more are suspected based on observation reports. A few of these territories include some of the most heavily used portions of the park in Zion Canyon. The peregrine falcons using these sites have habituated to the large numbers of people and

noise generated from high traffic volumes in the canyon.

Park personnel currently monitor six peregrine falcon territories on an active basis during the breeding and nesting season (approximately February through July). These are the falcon territories that encompass popular cliff-climbing sites in the park. Each year on February 1, the cliff faces that have historically harbored falcon nests are closed to climbing. As the birds select their nesting areas for the year, the cliffs not selected by the birds are reopened. The nesting cliffs remain closed until the young fledge. Closures are established upon and are dependent upon continued monitoring by park personnel.

It is not expected that the birds would be disturbed by the increased use in the canyon and on other trails far below the cliffs used by these birds. Park managers would continue to close cliff faces supporting aeries during the critical breeding and nesting periods. A climbing management plan (yet to be written) will address climbing routes in relation to peregrine nesting areas.

Peregrines are, however, known to be sensitive to disturbances such as human presence or aircraft noise above or near their nest site. Most trails and routes in the park follow drainage bottoms and not cliff edges, although two popular trails, Angels Landing and Cable Mountain, do allow access above several cliff faces the falcons have used for nesting. Peregrines have nested several times on Cable Mountain, but no nesting has been reported in recent years on Angels Landing, where peregrines have historically nested. These two potential nest sites would continue to be affected by continued or potentially increased human use in these areas.

To currently use low level aircraft in the park, pilots must obtain special permission from the superintendent. On rare occasions, park managers authorize the use of helicopters, for such

activities as suppressing fires, maintaining repeaters, and conducting scientific studies. During the nesting/breeding season, air traffic is directed away from peregrine nesting areas in these circumstances. In a future aircraft management plan, the Park Service will address the issue of reducing conflicts between aircraft and peregrine falcons.

The alternatives are expected to have no effect on the overall peregrine population, given the continuing use of occupied territories in the park, the existence of extensive suitable habitat throughout the park, the implementation of use restrictions near occupied nest sites, and the Park Service's proposal that no new trails and routes would provide direct access to cliff faces above known nest sites.

Southwestern willow flycatcher — The federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*) nests primarily in mid-to-low elevation riparian habitats along rivers, streams, or other wetlands where dense growth of willows or other plants are present. The only confirmed sighting of this neotropical migrant in the park was in 1994 along the East Fork of the Virgin River near the western end of Parunuweap Canyon. A 1998 survey of the park's riparian habitat that seemed capable of supporting flycatchers found no birds, though several pairs have been found downstream of the park along the Virgin River.

No impacts on willow flycatcher habitat in Parunuweap Canyon would be expected under any of the alternatives because there would be either no recreational use (no action and alternative B) or very limited NPS or NPS-sanctioned guided educational trips (the proposed action and alternative A) through the canyon. Under the alternatives, travel paths would be designated, which would avoid known and potential flycatcher habitat. Thus, no adverse effects on southwestern willow flycatchers are expected to result from the alternatives being considered.

The restoration of portions of the North Fork of the Virgin River may improve riparian habitat and potentially flycatcher habitat. However, no records exist that document the occurrence of this species there. The river management planning process would address the specific strategies and methods for restoring the river and managing visitor use. That plan would more closely evaluate impacts of the North Fork restoration effort, including potential benefits to flycatchers.

Utah prairie dog — The Utah prairie dog (*Cynomys parvidens*), a federally threatened species, has not been recorded in nor is it believed to occur within the park. However, the southern tip of the prairie dog's range is close enough to Zion's northern border that the park may be within the species' dispersal range. Open grasslands that cover plateaus in the northernmost portion of the park would be the most likely areas the prairie dog would colonize. The Park Service plans no development in these areas. Additionally, most use occurs in the canyon bottoms, not along the plateaus. Thus, no impacts are expected to occur on this species from any of the alternatives under consideration.

Rare plant species — There are no federally listed plant species within Zion National Park; however, a number of plant species endemic to the park and/or considered rare in Utah do occur. In the late 1980s, the Park Service conducted a general parkwide survey that located numerous populations throughout the park. In 1998, detailed surveys and mapping of a few populations indicated that many of the rare plant species may be more abundant and have larger distributions than originally found. Two of the species are associated with hanging gardens. The others are scattered throughout the park, with many occurring on slick rock and mesa tops.

Visitor use near rare plant populations primarily occurs along trails or on bare rock; however, off-trail hiking or walking in slick

rock areas can lead to inadvertent trampling of rare plants. Trails can be located and routes identified to avoid impacts on rare plants. Mitigation measures can also be employed, such as erosion control or placement of barriers, in specific areas where necessary to control potential indirect effects on plants from trail erosion or social trailing.

Populations most vulnerable to visitor disturbance occur in slick rock areas that are fairly accessible and inviting along the Zion-Mt. Carmel Highway. Current impacts on rare plants in this area are minimal, and impacts are expected to remain so under all the action alternatives because this area would be a primitive or pristine zone. Under all alternatives and in all zones, park staff would survey proposed development sites for rare plants and avoid populations.

Vegetation (General). Under all the alternatives, localized vegetation damage and loss would continue to occur along trails and routes and near visitor facilities and park roads. Because new facilities would be built in previously disturbed sites, additional disturbance to vegetation would be minimized. In general, impacts on vegetation would be minor due to their localized nature and the expectation that local and regional populations would not be affected. To provide more focus to the impact analysis, the specific impact topic of riparian/wetland communities was evaluated based on the limited occurrence of riparian/wetland communities in the park and the proportionately higher visitor use these areas receive compared to surrounding arid lands.

Specialized Plant Communities. Several plant communities are unique in Zion, among them relict communities and rock crevice communities. Relict communities, which occur in areas such as isolated mesa tops inaccessible to domestic grazing, represent undisturbed plant communities. These relict communities would not be subject to impacts

from any of the alternatives. The majority of the rock crevice communities are inaccessible. Impacts from continuing or increased visitor use, particularly rock climbing or scrambling, would continue to be minor, due to the limited extent of the impacts relative to the widespread distribution of this community in the park.

Wildlife (General). Continued or increased visitor use of trails, routes, and other visitor facilities in all of the alternatives would disturb various wildlife species that live or travel near these areas. Construction associated with new facilities would temporarily disturb or displace wildlife species and would result in the loss of small amounts of habitat. Habitat loss would be reduced by the construction of new facilities in previously disturbed sites. To further reduce impacts on wildlife, park managers would implement mitigation measures, such as restricting visitor activities during sensitive times, providing visitor education, and enforcing laws. Under all the alternatives, impacts on most wildlife species are generally expected to be minor and not affect the abundance or distribution of local or regional populations. To provide more focus to the impact analysis, this plan further evaluates the potential for impacts on three specific wildlife species (Virgin spinedace, Mexican spotted owl, and desert bighorn sheep).

Wild and Scenic Rivers (Natural Resources). All actions within the action alternatives for the river segments proposed for wild, scenic, or recreational river designation would be consistent with the recommended river classifications. These designations would not be expected to substantially increase visitor use levels in the park or have substantial, if any effect on the resources already protected in the park.

Prime and Unique Farmlands. There are no prime and unique farmlands within the park; no effect on these lands would occur.

Energy Requirements and Conservation Potential.

None of the alternatives presented in this plan would result in a major change in energy consumption compared to current conditions. As noted in “Park Policies and Practices,” the National Park Service would pursue sustainable practices whenever possible in all decisions regarding park operations, facilities management, and development in Zion. Whenever possible, the Park Service would use energy conservation technologies and renewable energy sources.

Natural or Depletable Resource Requirements and Conservation Potential. None of the alternatives would result in the extraction of resources from the park. As noted in “Park Policies and Practices,” under all of the alternatives, park staff would apply ecological principles to ensure that the park’s natural resources were maintained and not impaired.

Cultural Resource Topics

During the planning process, the planning team consulted the Utah State Historic Preservation Office and the Advisory Council on Historic Preservation. These groups have concurred that they will consider the effects on cultural resources once the Park Service develops specific undertakings of the approved *General Management Plan*.

The following actions will take place under all of the alternatives:

- Park staff would comply with the mandates of the National Historic Preservation Act, as amended, and other laws, regulations, executive orders, and memoranda of agreement that pertain to the protection, preservation, and management of cultural resources.
- As per section 106 of the National Historic Preservation Act, as amended, park staff would continue to consult with the Utah State Historic Preservation Officer, the

Advisory Council on Historic Preservation, affiliated Indian tribes, and members of the affected public to

identify eligible or listed properties on the National Register of Historic Places

consider project-related effects on those properties

develop appropriate measures to avoid effects or treatments that lessen adverse effects on eligible or listed national register properties

- Where appropriate, new construction would continue to meet the *Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation* (NPS 1995a) in terms of design, scale, and materials to ensure compatibility with existing historic architectural design and contextual setting.
- In accordance with the provisions in the Native American Graves Protection and Repatriation Act (NAGPRA), the National Park Service would continue to consult with affiliated Indian tribes if park personnel or visitors discovered burials containing human remains or funerary objects during any project-related activities. Park staff would cease all construction activities until consultation was complete.
- Park staff would apply the mitigation measures described under “Park Policies and Practices.”

The above actions should minimize the potential for impacts on cultural resources. Therefore, the planning team has decided not to further analyze effects on cultural resources in this plan.

Visitor Use and Experience Topics

Rivers. The designation as wild, scenic, or recreational would have no effect on the way

visitors experienced these rivers within Zion National Park. All of these rivers are currently being managed in ways that are consistent with their potential designation. As stated in the Wild and Scenic River Evaluation (appendix F), “wild and scenic designation would have little if any effect on uses within Zion National Park. The park is already administered for protecting the outstandingly remarkable resources, and building new dams is extremely unlikely. No uses would be foreclosed or curtailed that are not already occurring.” Therefore, the designation of rivers as wild, scenic, or recreational would have a negligible effect on the experience of Zion visitors.

Some of the river segments studied for designation are on BLM land. The Bureau of Land Management currently manages all but three of the segments in ways that are consistent with this designation, and currently allows the use of off-highway vehicles and mountain bikes on the Willis Creek, Kolob Narrows, and Goose Creek segments. These uses would be prohibited if the segments were designate as wild rivers. However, the three areas receive almost no recreational use due to their isolation and difficult accessibility. Therefore designating these segments as wild and closing them to mountain bike and off highway vehicle use would have a negligible impact on the visitor experiences for these segments.

Night Sky. Zion’s night sky is a feature that contributes to the quality of the visitor experience. Current park policy states that the National Park Service will seek to minimize the intrusion of artificial light into the night scene by limiting artificial outdoor lighting to basic safety requirements, shielding the lights when possible, and using appropriate lamp styles.

There are few actions proposed in any of the alternatives that would affect the night sky. The construction of a visitor facility on the

east side of the park, either within or outside the park boundaries, would necessitate some night-time lighting. However, the effects of this lighting would be minimized by the mitigation techniques described above.

Socioeconomic Topics

Environmental Justice. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs/policies on minorities and low-income populations and communities.

For the purpose of fulfilling Executive Order 12898, in the context of the National Environmental Policy Act, the planning team assessed the alternatives presented in this plan during the planning process. The team determined that none of these alternatives would result in significant direct or indirect negative or adverse effects on any minority or low-income population or community. The following information contributed to this conclusion:

- The developments and actions of the alternatives would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect negative or adverse effects on any minority or low-income population or community.
- The impacts on the natural and physical environment that occur due to any of the alternatives would not significantly and adversely affect any minority or low-income population or community.
- The alternatives would not result in any identified effects that would be specific to any minority or low-income community.

- The Zion planning team actively solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Park staff members have consulted and worked with the affected American Indian tribes and will continue to do so in cooperative efforts to improve communications and resolve any problems that occur. Also, the planning team did not identify any negative or adverse effects that disproportionately and adversely affect the tribes.
- Impacts on the socioeconomic environment due to the alternatives are minor or positive and occur mostly within the local and regional geographic area near the park. These impacts would not occur at one time but would be spread over a number of years, thus mitigating their effects. Also, the planning team does not expect impacts on the socioeconomic environment to significantly alter the physical and social structure of the nearby communities.

METHODOLOGY

The planning team based this impact analysis and the conclusions in this part largely on the review of existing literature and park studies; information provided by experts within the National Park Service and other agencies, and park staff insights and professional judgments. Further explanations and caveats of how the team analyzed the impacts for two natural resource impact topics follow below.

It is important to remember that all of the alternatives assume that park managers will apply mitigation measures to minimize or avoid impacts. Increased visitor use generates the need for additional monitoring and the mitigation of impacts. If mitigation measures cited in this part and all the alternatives are not

applied, the potential for resource impacts would increase and the magnitude of those impacts would rise.

Facilities and Resources on the North Fork of the Virgin River Floodplain

The focus of this impact assessment is on natural river processes and hazards associated with flooding. The analysis mentions the impacts on other ecological floodplain values, but assesses them further under riparian communities/wetlands and native fish species sections. Potential hazards for specific existing facilities (i.e., Zion Lodge and associated buildings and the Birch Creek water tank and corral) and any new facilities proposed under the alternatives in relation to the 100-year, 500-year, and probable maximum floodplain were evaluated.

Mexican Spotted Owl

The Mexican Spotted Owl Recovery Plan (USFWS 1995) identified recreation as the primary potential threat to spotted owls in the Colorado Plateau Recovery Unit. The following impact assessment is based on the management recommendations contained in the spotted owl recovery plan that relate to recreational use or development. Based on recovery plan guidelines, park staff established 18 protected activity centers for all known owl territories in the park. The recovery plan recommendations specific for recreation are as follows:

- No construction of new facilities or expansion of existing facilities should take place within protected activity centers during the breeding season, March 1 through August 31. Any construction within protected activity centers during the nonbreeding season should be considered on a case-specific basis.

- Managers should, on a case-specific basis, assess the presence and intensity of allowable recreational activities within protected activity centers. They should consider spatial and temporal restrictions for new activities and seasonal closures of specifically designated recreational activities, where appropriate.

One other general recommendation that would also apply to actions in the alternatives is as follows:

- Road or trail building in protected activity centers should generally be avoided, but these activities may be allowed on a case-specific basis, if pressing management reasons can be demonstrated.

The alternatives were evaluated based on the presence of protected activity centers in areas of proposed or existing facilities, trails, and routes, and the recovery plan recommendations.

IMPACTS OF THE NO-ACTION ALTERNATIVE

NATURAL RESOURCES

Air Quality

Analysis. In general, expected increases in visitation under this alternative, coupled with the retention of existing traffic patterns and vehicle use, would result in moderate increases in localized emissions. This potentially could reduce near-range visibility. The Kolob Canyons Road, Kolob-Terrace Road, and Zion-Mt. Carmel Highway would likewise experience increased traffic, resulting in minor, short-term vehicle emissions and reduced near-range visibility.

Cumulative Effects. No other actions besides those noted above are known that would have a cumulative negative impact on the park's air quality. Indeed, the implementation of the Zion Canyon transportation system, combined with actions being taken to minimize pollution sources in the park (e.g., encouraging campers to use gas stoves for cooking), would moderately reduce local emissions and improve near-range visibility.

Conclusion. The no-action alternative would result in minor to moderate, localized, adverse impacts on air quality.

Water Quality

Analysis. Increased use of facilities, parking areas, picnic areas, campsites, and trails would result in minor increases in suspended sediment, turbidity, and fuels in nearby streams. Increased turbidity would occur in localized areas, where visitors were eroding soils near streams, and along stream reaches, where visitor activities (wading, hiking, and fishing) directly disturbed stream bottom sediments. Water pollution would also continue to occur from trash or human wastes

deposited in or near streams. With increased use along some streams within the park, particularly along the intensively used reaches of the North Fork of the Virgin River, some moderate localized decreases in water quality would likely occur. However, continued visitor management efforts (e.g., interpretive displays and programs, ranger patrols) would help minimize effects on water quality from increased use.

Cumulative Effects. Water pollution from sources outside of the park would be addressed through cooperative efforts between park staff, adjacent landowners, and the Utah Department of Natural Resources, as outlined under "Park Policies and Practices." One effort would be National Park Service participation in the Virgin River Watershed Management Plan currently under development. Therefore, cumulative impacts are expected to be negligible.

Conclusion. Increased use under the no-action alternative would likely cause moderate, adverse effects on water quality.

North Fork of the Virgin River Floodplain

Analysis. The Zion Lodge and associated buildings would remain within the probable maximum floodplain under this alternative (and all of the other alternatives) due to a lack of other suitable sites on the narrow canyon bottom. Estimates of flood stage indicate that the existing road grade would protect this development and contain both the 100- and 500-year floods. An exception to this estimate is in the upstream reach adjacent to the main lodge building, where the 500-year flood would overtop the road and inundate a portion of the lawn area in front of the lodge. However, the flood depth would not reach the lodge foundation, and overbank velocities

would not likely exceed two feet per second. Even with failure of the road grade, neither of these design floods would reach the elevation of the lodge, since the foundation was estimated to be a minimum of three feet above the 100-year flood and one foot above the 500-year flood.

No floodplain mapping or flood stage estimates have been made for the support facilities (housing, water tank, and corrals) on the Birch Creek point. Based on the topography and river channel characteristics in this area, these facilities are likely elevated outside of the 100- and 500-year floodplains, but would be within the probable maximum floodplain.

Visitors would continue to recreate in flood hazard areas along the North Fork of the Virgin River and its tributaries because these areas would be unavoidable within the confines of the canyon walls. On average, dangerous floods would occur every year in slot canyons, and a few times a century in the broader canyon. The existing evacuation plan and warning system should provide adequate time for evacuation and would remain in effect. Park staff would also continue to emphasize public education and awareness of flood hazards and place signs at existing picnic facilities that warn of flash flood hazards and indicate evacuation areas. These measures would minimize potentially hazardous conditions. Based on expected increased use levels in the canyon and up through the lower Narrows, there would be a minor to moderate, long-term increase in the number of people exposed to flood hazards.

Floodplain functions in Zion Canyon would continue to be impaired for 4.5 miles (of the 9.5 miles from the bottom of the Narrows to the southern park boundary) due to past channelization. The existing river structures would maintain the current channelized floodplain conditions, which increase the river's tendency to incise and further isolate

the adjacent terraces from flood flows and alluvial ground water.

In these armored reaches, the river would continue to have little opportunity to develop the meandering, riffle-pool morphology typical of rivers in low-gradient alluvial valleys. Lack of an active floodplain would continue to negatively affect important hydrologic and ecological functions in the canyon, preventing conditions necessary for riparian vegetation growth, and to a lesser extent, slowing and storing flood flows for later release and increased groundwater levels. Associated river and floodplain resources, including riparian/wetland vegetation, Virgin spinedace, flannelmouth sucker, and potential southwestern willow flycatcher habitat, would continue to be degraded. Because of the importance of these resources and their very limited occurrence in the park and region, the perpetuation of channelization would be a moderate to major, long-term, adverse impact in the affected reaches.

Cumulative Effects. Many of the existing developments, and virtually all of the approved transportation system developments, would be within the North Fork probable maximum floodplain. These facilities do not affect the natural floodplain values, except for minor effects on groundwater recharge from impervious surfaces. Diversion structures for the Flannigan and Crawford/Gifford ditches and the concrete apron at the Temple of Sinawava would remain. These structures probably impede, but do not block, native fish movements. The concrete apron that protects a water pipeline crossing at Birch Creek also would remain, continuing to impact river processes and detract from the natural appearance of the river. It may also impede but not block the movement of aquatic species. Overall, all of these structures would continue to have a moderate to major, negative cumulative impact on the river's morphology and associated values.

Past channelization throughout the North Fork floodplain, along with other past agricultural and grazing impacts, have all contributed to a more narrow, incised, less meandering channel, with minimal overflow capacities. Use and development activities have also altered much of the North Fork's floodplain and associated natural values south of the park. Based on the extent of the modifications to the river and the associated floodplain values, the no-action alternative would have a moderate, long-term, cumulative impact; the alternative would perpetuate highly modified conditions in the affected reaches within the park, which would contribute to the overall altered character of the North Fork.

Conclusion. There would be no increase in the level of development in the floodplains under the no-action alternative. Zion Lodge and the facilities at Birch Creek would remain within the probable maximum floodplain of the North Fork. There would likely be a minor to moderate increase in the number of people within the floodplain, but flood warnings and public awareness efforts would reduce flood risks to people. If use continued to increase in the canyon, a minor to moderate, long-term increase in the number of people exposed to flood hazards would be likely.

Past channelization would continue to impair floodplain functions in Zion Canyon for 4.5 miles. The no-action alternative would have a moderate to major, long-term, adverse effect on the North Fork's natural river processes and other natural floodplain values within the park.

Riparian/Wetland Communities

Analysis. Existing levees and other control structures have changed and would continue to change the shape of the North Fork's natural river channel, erosion processes, and flow patterns. As a result, there would continue to be decreased inundation, decreased channel

movement, and decreased sediment deposition along 4.5 miles of the river floodplain. Confining and straightening the channel have also caused it to incise three to five feet, further isolating the floodplain and making it more arid.

Under the no-action alternative, these processes would continue to directly contribute to reduced riparian area or reduced potential for natural riparian development along the river corridor. Riparian vegetation such as cottonwoods and willows depend upon newly deposited floodplain sediments to propagate. As the senescence of the existing older overstory species proceeded, the lack of propagation would result in the long-term loss of riparian vegetation in channelized reaches of the river near the lodge and campgrounds. Plants better adapted to more stable and arid conditions would become established. The appearance of a riparian system might be partly maintained through plantings, irrigation, and other artificial means, but this arrangement would lack many of the attributes of a natural riparian community.

Recreational use along the North Fork is currently quite high and would likely increase. Trampling and localized loss of riparian vegetation, primarily near the developed areas and head of the canyon would continue. Methods to help mitigate damage might include exclusions from particular areas, barriers, or designated river access/crossing points.

Overall, this loss of riparian habitat along the North Fork from channelization and recreational use would be a moderate to major, long-term, adverse impact, with the greatest impact occurring along the channelized and heavily used sections of the river.

Riparian communities elsewhere in the park are relatively intact. Impacts from continued or increased use in canyons in the less accessible backcountry would be minor.

Increased use of popular areas that already had high use levels (e.g., Left Fork, La Verkin/Kolob Arch, Middle Fork of Taylor Creek) would result in greater impacts on riparian understory vegetation in localized areas along the creeks. The mitigation of impacts might include on-site reclamation, visitor education, improvements to trails, or the regulation of use levels through the permitting system.

Cumulative Effects. Riparian communities along the North Fork are also negatively affected by the invasion of exotic species (e.g., tamarisk, cheatgrass, ripgut brome) and browsing by a high population of mule deer that use the canyon. These conditions also contribute to the overall modified environment, which cumulatively result in minor to moderate, long-term, adverse impacts.

Riparian areas within the park represent only a small portion of those found regionally. Large scale loss and modification of riparian habitat in the southwestern United States have occurred from urban and agricultural development, water diversion and impoundment, channelization, livestock grazing, off-road vehicle and other recreational uses, and hydrological changes resulting from these and other land uses. The park represents a significant portion of the upper Virgin River watershed. Continued loss of riparian habitat in the park would have a negative cumulative impact on riparian areas within the watershed, which would contribute to the major loss of riparian areas that has already occurred.

Conclusion. As a result of the isolation of the North Fork from its floodplain in portions of Zion Canyon, the riparian system along 4.5 miles of the river would continue to decline and become more arid. Impacts on riparian communities within the park would be moderate to major, with the greatest impact occurring along the channelized and heavily used sections of the North Fork. This loss

would be relatively small from a regional perspective, but it would contribute to the continuing major loss of riparian areas within the Virgin River watershed. In other riparian areas within the park, impacts such as trampling would be minor with mitigation.

Hanging Gardens

Analysis. Impacts on hanging gardens occur primarily when people run their hands across the area, inadvertently removing vegetation and possibly rubbing Zion snails (a rare, endemic species) off the surface. However, the Zion snail may retreat into rock crevices during certain times of the year, leaving them less susceptible to direct impacts.

Hanging gardens within Zion Canyon, including the Narrows, would continue to be most susceptible to potential impacts from visitor use. To prevent human contact with the gardens and subsequent damage or loss of vegetation from increased visitor use in the canyon, park managers would continue to use mitigation measures, such as trails and barriers. In particular, these measures would be implemented in one hanging garden along the Riverside walk that has lost vegetation. Thus, mitigation would limit damage or loss of vegetation, resulting in minor, short-term, adverse impacts on gardens.

Cumulative Effects. Past human impacts on several hanging gardens have been substantial, but have been mitigated with the use of trails and barriers that prevent contact with the gardens. Consequently, although several hanging gardens have been readily accessible, loss of vegetation has been minor. With continued application of mitigation measures, adverse cumulative impacts on hanging gardens would be minor and short term.

Conclusion. Under the no-action alternative, there would continue to be the potential for additional impacts on hanging gardens that are not protected by barriers. However, mitigation

measures would limit damage or loss of vegetation, resulting in minor, short-term, adverse impacts on hanging gardens.

Microbiotic Crusts

Analysis. The Park Service would propose no new major park developments under the no-action alternative, but would review all new projects to ensure that impacts on microbiotic crusts are avoided or minimized. However, hikers would continue to be allowed off-trail in all areas of the park and would place few limits on numbers. This could result in widespread, long-term, adverse impacts (e.g. compaction, erosion) to microbiotic crusts, with a moderate to major impact on localized areas.

Cumulative Effects. In general, many of the soils in the park have recovered from the effects of past grazing, farming, and logging. However, permanent loss of microbiotic crusts has occurred in areas of development such as roads, trails, and buildings. Although widespread impacts could occur with increased visitor use, most of the approximately 75,000 acres of park lands that likely support microbiotic crusts would not be subject to disturbance. Thus, this alternative would have a minor cumulative impact on microbiotic crusts.

Conclusion. Moderate to major, localized, long-term impacts on microbiotic crusts would likely continue in areas with extensive development and use. But most of the approximately 75,000 acres of lands likely supporting microbiotic soils within the park would not be subject to disturbance. Thus, from a parkwide perspective, impacts on microbiotic crusts are expected to be minor.

Virgin Spinedace

Analysis. As noted previously, the North Fork would continue to have little opportunity to

develop the meandering, riffle-pool morphology typical of rivers in low-gradient alluvial valleys. Consequently, riverine ecology would continue to be radically altered, and few deep pools would be available to spinedace or other fish. Lack of an active floodplain would negatively affect the propagation of riparian vegetation, which in turn would directly affect the spinedace. That is, the riparian vegetation moderates water temperatures, stabilizes stream banks (which reduces stream siltation), provides hiding cover, and provides biomass input for the aquatic environment that support invertebrates and habitat for insects that are food sources for fish. Thus, the existing river stabilization measures would continue to have a long-term, minor to moderate, adverse impact on spinedace habitat due to diminished pool/riffle habitat and riparian vegetation in portions of the North Fork.

A recent study indicated that, within Zion Canyon, river recreational use is affecting the distribution, abundance, and community structure of native fish. In areas with high levels of recreational use, there was lower community diversity and abundance of species, particularly for younger fish (Sappington 1998). Although this study did not find a difference in food availability in the form of aquatic insects and algae, a separate study indicated that areas of high recreational use show decreased invertebrate biomass (Shakarjian and Stanford 1998). Abundance of larval fish in shallow waters along the river margin was lower in high recreational use areas, suggesting that recreational use may reduce the supply of new recruits for adult populations in these areas.

Even moderate flash floods appear to reconfigure stream channel habitats altered by recreationists and redistribute fish throughout the river. However, an important factor in fish community recovery after disturbance is the presence of nearby colonizing populations. With continued high levels of recreational use, primarily in existing popular locations

between the campgrounds and southern park boundary and in the Narrows, it is likely that minor additional impacts on the population would occur. The ability of the spinedace to feed in high recreational use areas also would be affected due to turbidity. Should high levels of recreational use occupy an increasing greater proportion of the river, a major, long-term impact to the population may occur.

Negligible impacts on other spinedace populations in the park also are expected under the no-action alternative. Parunuweap Canyon and Shunes Creek would continue to be closed to public use. Depending on the structures used to divert water from Shunes Creek under an existing private water right, spinedace populations there could be temporarily negatively impacted. The Park Service is assessing the impacts of this action in a separate environmental assessment. Spinedace extend for only a very short distance into the park along North Creek, where large increases in public use are not likely because there are no existing trails or routes in that reach.

Cumulative Effects. The implementation of the conservation strategy outlined in the interagency conservation agreement for this species would reduce significant threats to Virgin spinedace and protect/enhance specific reaches of occupied and unoccupied historic habitat throughout the watershed. Continued protection of occupied habitat along the North Fork within the park would support the objectives of the agreement. Because the native fish community of the Virgin River drainage (including spinedace) occurs in historic levels of abundance only in the park and for a short distance downstream (Gregory and Deacon 1994, Valdez et al. 1990), minimizing further disturbance in this area is important (Williams and Deacon 1998). It is not likely that current high use levels will cause long-term effects on the spinedace and other native fish populations. However, if recreational use occurs in an increasingly

greater proportion of the river and decreases the supply of nearby colonizing fish, there would be a major, long-term, adverse cumulative effect.

The Zion National Park Water Rights Settlement Agreement of 1996 would protect against changes in flow and thermal regimes caused by upstream water developments that could affect native fish species. Land use upstream of the park may affect the water chemistry/sediment load in the North and East Forks, although upstream perturbations apparently have not had serious adverse effects on the fish community in the park. Substantial changes in land use or the alteration of the landscape (e.g., widespread logging or mineral extraction) are not anticipated. Park staff would work with other agencies and private landowners to minimize effects on park resources. A long-term water quality monitoring program would also allow for the early detection of potential impacts.

Conclusion. Along the North Fork, the abundance of larval fish and the ability of fish to feed would continue to be negatively affected in high recreational use areas of the river. Pools and riffles, and riparian vegetation would remain at diminished levels due to the presence of river stabilization structures. Recreational use and river channelization would continue to negatively affect the spinedace population and habitat to a minor to moderate degree. Should high levels of recreational use occupy an increasing greater proportion of the river, a major, long-term impact to the population may occur.

Mexican Spotted Owls

Analysis. Under this alternative, the Park Service would not construct any new facilities (i.e., buildings, roads, parking areas, campgrounds, or picnic areas) within any currently known spotted owl territory located in Zion National Park. Owls may be disturbed by the

presence of people or human activities, but little is known about recreational use impacts on Mexican spotted owls. Spotted owls are difficult to study or monitor, particularly so in Zion National Park, because of the rugged topography. Park managers have begun to monitor owl nesting activity and productivity in territories where impacts might be expected.

Very popular trails traverse through three owl territories associated with side canyons off of the main Zion Canyon, below the Temple of Sinawava. The Park Service expects the use of these trails to increase over existing levels. The results of recreational impact monitoring may warrant the Park Service to close portions of the trails where the owls are typically found or place signs requiring that people stay on the trail and out of side canyons frequented by owls during their breeding/nesting period (i.e., March 1 – August 31). Park personnel would enforce these closures. These measures would mitigate potential effects from increased visitation in these areas.

Under the no-action alternative, there would be an increased potential to adversely affect some of the known owl territories in the park backcountry. The planning team expects recreational use in the backcountry to increase. Even low levels of use may affect owl behavior. Two specific owl territories are most vulnerable to increased visitor disturbance. These territories include canyons along the Zion-Mt. Carmel Highway that are fairly accessible and inviting, although no designated trails or routes access these canyons. The Park Service would continue to monitor owl nesting activity and productivity to assess potential impacts. If necessary, visitor use also would be restricted to mitigate impacts on spotted owls based on increased backcountry use. This alternative is not likely to adversely affect the productivity of known territories.

Cumulative Effects. As part of the Zion Canyon transportation system planning process, the potential effects of implementing a canyon shuttle system and constructing shuttle stops, with the associated increased use of trails through side canyons that support owl territories, were evaluated. The implementation of the trail closures noted above were identified as part of that process to mitigate effects of increased use. No cumulative effects are expected.

Conclusion. This alternative is not likely to adversely affect the productivity of known territories. Park personnel would enforce trail closures and signing for side canyons off of the main Zion Canyon. Should increases in use occur in some backcountry owl territories, the Park Service would develop use restrictions.

Desert Bighorn Sheep

Analysis. The Park Service would continue to prohibit public recreational use of Parunuweap Canyon and Shunes Creek, which encompasses nearly one third of the sheep's range in the park. This would protect the sheep's range and lambing areas year-round, especially in the fall when sheep use the East Fork as a water source.

The increased use and proliferation of informal pullouts/social trails along the Zion-Mt. Carmel Highway could inadvertently disrupt sheep crossings. However, sheep would likely habituate to this human activity, and therefore only minor impacts would be expected.

Sheep would also be vulnerable to increased visitor use and exploration of side canyons off of this highway, particularly if use increased substantially south of the road in Gifford Canyon and/or Crawford Wash (both of which are frequented by sheep). Increased use could occur here because these areas are fairly accessible and no use limits would be in

effect. Depending on the levels and locations of visitor use, the sheep could potentially be displaced from a portion of their range, resulting in minor to moderate impacts. Should sheep be displaced from key portions of their range, this would be a major impact.

Cumulative Effects. There would be no cumulative impacts on this species under this alternative. The sheep may potentially be affected if air tours occur over their range in the park. The Park Service would prepare an air tour management plan to address this use and potential impacts on sensitive wildlife such as sheep.

Conclusion. Impacts on desert bighorn sheep would be minor to moderate due to the potential for unlimited visitor use in portions of the range the sheep frequently use for foraging. Displacement of sheep from key portions of their range would be a major impact.

VISITOR EXPERIENCES AND USES

Natural Sounds

Analysis. With increased use levels, the Kolob Canyons Road, Kolob-Terrace Road, and the Zion-Mt. Carmel Highway would likely experience increased vehicular traffic, resulting in moderate increases in noise. However, these areas already have diminished natural sounds due to existing traffic. In the backcountry, higher use levels also would tend to result in more noise (talking, shouting) and diminished natural sounds. Even with mitigation measures, natural sounds would likely decrease in popular areas and trails.

Cumulative Effects. The implementation of the Zion Canyon transportation system would moderately reduce mechanical noises from vehicular traffic. This action, in combination with the reduction of some other noise sources in the canyon, would result in a moderate, long-term, positive effect. On the other hand,

if aircraft overflights increased over the park, the noise of the aircraft in combination with the noise from increased vehicle use on the three roads and use of the backcountry would have a moderate, long-term, negative effect.

Conclusion. Overall, there would be a minor to moderate increase in noise impacts in the park from increased use and the retention of existing visitor use patterns and vehicle use. Mitigation would reduce some noise sources, particularly in the Zion Canyon, but there likely would be a minor to moderate, long-term, increase in noise, which would mask natural sounds.

Range of Visitor Experiences and Activities

Analysis. Under the no-action alternative, current conditions and management directions would remain the same and visitor numbers would most likely increase over time. In general, crowding and noise associated with increased visitation would increase, and opportunities for visitors to experience solitude, natural quiet, and the feeling of being immersed in a remote wildland would diminish in areas that were not closely managed. In several areas, managers would take action to protect resources and key visitor experiences, which would help mitigate the decline in opportunities to experience solitude and natural quiet. But since there would be no proactive limits on use, the quality and range of visitor experiences available would diminish, particularly during the peak season and at popular locations. This would have a moderate to major, adverse impact on visitors seeking those types of experiences.

In those areas with visitor use limits, the visitors who got permits would have a positive experience enjoying the resources and solitude. Visitors who could not obtain permits at their preferred time would be negatively affected by the restrictions.

Those visitors wishing to mountain bike, participate in commercially guided climbing or backpacking, or ride their horses in certain areas would need to go to other nearby recreation areas for these activities. The no-action alternative thus would have a moderate, negative impact on visitors who valued those activities. Visitors who valued being able to experience Zion's trails without sharing them with bicyclists, horseback riders, and guided groups, would have a moderate, positive impact from this alternative.

Kolob Canyons Road, Kolob-Terrace Road, Lava Point, and the east entrance and Zion-Mt. Carmel Highway areas — Visitation would likely continue to increase along the Kolob Canyons Road, the Kolob-Terrace Road, Lava Point, the Zion-Mt. Carmel Highway, and the east entrance. If visitors choose not to take the Zion Canyon shuttle and go elsewhere in the park, use levels in the above areas may increase at a faster rate.

As visitation increased in these areas, visitors would potentially experience more traffic congestion, crowding, noise associated with increased visitation (e.g., voices, vehicle noise), and fewer opportunities for solitude, particularly during the peak visitor season. The degradation of park resources due to increased visitor use may occur (e.g., increased litter and erosion, more social trails), which would reduce visitors' opportunities to view park resources in a natural state.

South entrance and the main Zion Canyon — Visitation levels will likely continue to increase in Zion Canyon. Opportunities for visitors to experience solitude consequently would decrease, particularly at popular areas such as the Temple of Sinawava and Weeping Rock. However, the shuttle system would manage the amount of visitor use and distribution within Zion Canyon depending upon the need to protect resources and provide quality visitor experiences. The extent of positive and negative impacts on the visitor

experience would depend on how the Park Service managed the transportation system (for example, the frequency of buses); these impacts can not be addressed at this time.

Proposed wilderness — The Park Service would continue to manage the areas proposed for wilderness as wilderness. As backcountry use continued to increase, backcountry users would have more encounters with other visitors and would find it more difficult to experience solitude and quiet, particularly during the peak season. Visitors could begin to experience park resources in a less pristine state. For example, visitors might see eroded trails, damaged vegetation, more social trails, or increased litter. While actions would continue to be taken to limit visitor impacts on resources and maintain wilderness values, these actions would be reactive and occur on a case-by-case basis. Overall, with increased use, there would likely be a gradual decrease in opportunities to experience solitude, natural quiet, and pristine park resources in popular areas (e.g., La Verkin Creek, the West Rim trail), which would have a moderate, negative impact on those visitors who expected or desired those experiences.

Visitors would continue to be able to use the proposed wilderness in a relatively unrestricted fashion, although they would still need permits for overnight use and face the same restrictions on day use in the Left Fork of North Creek and the Narrows and the use of horses.

Visitors would continue to be able to choose where to hike, climb, or camp in most of the proposed wilderness. For some visitors, unrestricted access is a defining characteristic of a wilderness experience. This alternative would continue to have a moderate, positive impact on those visitors who valued personal choice, unrestricted access, and personal convenience.

Research natural areas — The Park Service would take no actions that would affect visitor use in the existing research natural areas. The difficulty in accessing most of these areas would likely prevent the use of these areas from increasing appreciably.

The Park Service would continue to manage Parunuweap Canyon as a proposed research natural area and keep it closed to visitors. Thus, the no-action alternative would continue to have a negative impact on those visitors who sought to enter this area and experience its resources. For the majority of the park's visitors, the closure would have no effect on their experience because they are not familiar with Parunuweap.

Scenic views — Most of the park's viewshed would continue to appear natural to most visitors. Visual intrusions would likely continue to increase as development outside the park increased, particularly in the Springdale area. While park staff would continue to work with neighboring landowners to reduce the impacts of development, in several areas, the opportunities for visitors to look out from the park and see a natural landscape with no modern intrusions on the visual scene would likely gradually decrease over time. This would have a minor to moderate, adverse impact on the experiences of park visitors.

Cumulative Effects. Under the no-action alternative, increased use levels would likely occur in frontcountry areas, including the Kolob Canyons Road, Kolob-Terrace Road, and the Zion-Mt. Carmel Highway. The operation of the Zion Canyon shuttles also may result in more visitors going to these areas rather than the main canyon. As overall park visitation increases, visitors may experience more crowding and noise and observe more resource impacts at the facilities and trails in these areas. The changes would occur slowly, but would eventually have a moderate, negative cumulative impact on those visitors

wishing to experience solitude, quiet, or a "rustic" park experience.

Conclusion. Under the no-action alternative, the quality and range of visitor experiences would gradually decrease in popular areas if visitation increased and the Park Service took no management actions. Although most visitors would likely continue to have what they consider to be a "good" park experience, opportunities for experiencing solitude and quiet would continue to diminish in areas that park personnel were not closely managing. Crowding and traffic congestion would likely increase in frontcountry areas other than the main Zion Canyon. On the other hand, visitors would continue to have unrestricted access to many park resources. Overall, if use levels continued to increase, the no-action alternative would likely have a minor to moderate, negative impact on visitors' experiences in Zion.

Visitor Experiences at Other Recreational Areas Nearby to the Park

Analysis. As visitation increased in the park and opportunities to experience quiet and solitude decreased, visitors desiring quiet and solitude might choose to go to other public land areas. This would have a minor negative impact on visitors' experiences at other nearby attractions.

Cumulative Effects. Relatively few people would likely be displaced to other state and federal recreational lands and facilities as a result of the actions (or nonactions) of this alternative. More people may be displaced with the operation of the shuttle system — people may not have the time to take the shuttle or they may not want to leave their personal vehicles. Some of these people may choose not to come to Zion or decide to cut their trips short, but they still would be visiting these other recreational areas as part of their "Grand Circle" vacations. Thus, the no-action alternative would have a negligible

cumulative effect on visitor levels and experiences in other recreational areas.

Conclusion. If visitation continued to increase and the Park Service took no other management actions, some people might be displaced from Zion to other nearby recreational areas. This would likely have a negligible to minor, negative effect on the experiences provided at these areas.

SOCIOECONOMIC ENVIRONMENT

Analysis. Since the no-action alternative would mean that current management directions and conditions would remain essentially the same, little change in the short- or long-term socioeconomic conditions related to the park's impact on the local region would likely occur. The park would continue to be a part of the local socioeconomic environment, and the National Park Service's expenditures for goods, services, and staff would continue to benefit the area. The park would still attract visitors, and their spending patterns would continue to contribute to the regional economy.

With continued increase in use levels, some business activity in the local area may increase, resulting in some minor to moderate, positive, benefits for some firms and/or individuals. These benefits may be long term as well as short term, depending upon whether or not the potential increases in business activity are sustainable.

Increased levels of visitors to the park and their concurrent demands for goods and services has caused the private sector outside the park to respond with increased levels of development and economic activity. In particular, the gateway community of Springdale would likely continue to experience further development and more frequent traffic congestion, with associated increased demands upon local infrastructure and public services (e.g., roads,

water and sewer, police and fire protection, emergency medical services). Other gateway communities would experience similar impacts.

Cumulative Effects. Zion National Park has been a protected area since 1909. As a result of increased visitation to the park, business and residential development have increased. This growth trend has had a moderate to major, positive impact on the local/regional economy. For example, in Springdale, a theater/shopping complex and new motels were built in the 1990s, which have provided long-term employment opportunities for local residents. The planning team expects the positive effects of the growth trend on the local and regional economy to continue, but do not expect this alternative to change the ongoing trend. The implementation of the Zion Canyon shuttle system would result in additional NPS expenditures and would have a positive, long-term benefit on the local and regional economy. Overall, the no-action alternative would likely have a long-term, negligible to minor, positive cumulative effect on the local and regional economy.

Conclusion. The park would continue to contribute to the local economy in the short and long term. Some individuals and/or firms may be positively affected, depending upon individual circumstances. However, the no-action alternative would result in a negligible, positive change to the park's overall contribution to the local/regional socioeconomic environment.

UNAVOIDABLE ADVERSE EFFECTS OF THE NO-ACTION ALTERNATIVE

No major adverse natural resource impacts are expected.

If the National Park Service took no additional visitor management actions, and use levels continued to increase, the quality of the visitor

experience would likely diminish in some popular frontcountry areas and in day use areas in the proposed wilderness. Increased crowding and congestion and fewer opportunities for solitude and quiet in areas like the side canyons off the Zion-Mt. Carmel Highway would be unavoidable adverse effects of this alternative.

**RELATIONSHIP OF SHORT-TERM
USES OF THE ENVIRONMENT AND
MAINTENANCE AND ENHANCE-
MENT OF LONG-TERM
PRODUCTIVITY**

Maintaining channelized sections of the North Fork of the Virgin River would result in the continued long-term loss of productivity of the biological resources associated with the river and its floodplain.

**IRREVERSIBLE AND IRRETRIEV-
ABLE COMMITMENTS OF RE-
SOURCES FOR THE NO-ACTION
ALTERNATIVE**

There would be no irreversible or irretrievable commitments of resources under the no-action alternative.

IMPACTS OF THE PROPOSED ACTION

NATURAL RESOURCES

Air Quality

Analysis. Similar to the no-action alternative, increased visitation and associated increased vehicle use would create moderate increases in localized emissions and the reduction in near-range visibility. However, park personnel may need to restrict the number of vehicles along the Kolob Canyons Road in the future, to fulfill zone prescriptions. This action would reduce vehicle emissions and improve near-range visibility to a minor degree, as compared to the no-action alternative.

There would be some short-term, localized, minor impacts on air quality resulting from particulates and machinery fumes generated during the construction, removal, and improvement of facilities. Park personnel would apply water or other palliatives to control dust, and machinery would have to meet emission standards.

Cumulative Effects. No other actions are known that would have a cumulative negative impact on the park's air quality. The implementation of the voluntary Zion-Mt. Carmel Highway shuttle, combined with the Zion Canyon transportation system and actions taken to minimize pollution sources in the park (e.g., encouraging campers to use gas stoves for cooking), would moderately reduce local emissions and improve near-range visibility.

Conclusion. Parkwide, little change would be likely in the park's air quality based on the proposed action. There would be a moderate increase in vehicle emissions and decrease in near-range visibility along roads. However, if vehicle use along the Kolob Canyons Road were restricted, there would be a minor reduction in vehicle emissions and

improvement in near-range visibility.

Construction activities also would result in a minor, short-term decrease in local air quality.

Water Quality

Analysis. The construction and use of focused visitor facilities, parking areas/trailheads, picnic areas, campsites, and trails could result in minor increases in suspended sediment, turbidity, and petroleum residues in nearby streams. Construction impacts would be temporary and mitigated by placing silt fencing, retaining and replacing topsoil, revegetating areas, selectively scheduling project work, or applying other site-specific measures that would reduce runoff from construction sites. Increased turbidity would occur in localized areas where visitors eroded soils along stream banks and along reaches where visitor activities (e.g., wading, hiking, fishing) directly disturbed bottom sediments. Water pollution would also continue to occur from trash or human wastes deposited in or near streams. With increased use along some streams within the park, particularly along the intensively used reaches of the North Fork of the Virgin River, some localized decreases in water quality would likely occur. However, increased use would likely lead to only minor adverse effects on water quality, due to increased visitor management efforts in this alternative, such as designating water access points, regulating use levels, and timing use, as well as applying other mitigation measures (e.g., increased visitor education, improved disposal of backcountry human wastes, placement of sanitation facilities, and the possible revegetation of portions of the banks and floodplain of the North Fork).

River restoration measures along the North Fork of the Virgin River that involved the physical manipulation of the river banks or

bed would result in moderate, short-term increases in turbidity. Increased sediment discharge could continue to occur intermittently for a few years, depending on the modifications that were made to the channel. However, the vast majority of this discharge would occur during flood events when the river was naturally very turbid.

Cumulative Effects. The Park Service would address water pollution from sources outside of the park through cooperative efforts between the park staff, adjacent landowners, and the Utah Department of Natural Resources as outlined under "Park Policies and Practices." One such effort would be NPS participation in the Virgin River Watershed Management Plan currently under development. Therefore, cumulative impacts would most likely be negligible.

Conclusion. Minor impacts on water quality, such as increased turbidity, sedimentation, and bacterial contamination, would likely occur in localized areas with increased use. Minor short-term increases in turbidity and sedimentation would occur during construction, but these impacts could be mitigated through accepted construction practices. Moderate short-term increases in turbidity would occur during river manipulation activities. Occasional short-term increases in turbidity from river restoration measures may occur for several years.

The North Fork of the Virgin River Floodplain

Analysis. Hazards related to flooding would be similar to those of the no-action alternative, except that new picnic areas could be added in the canyon, most likely outside of the 100- and 500-year floodplains, but not outside of the probable maximum floodplains. The existing evacuation plan and warning system should provide adequate time for evacuation. Park staff would also continue to emphasize

public education and awareness of flood hazards and would add signs to the new and existing picnic facilities to warn of flash flood hazards and evacuation areas. These measures would minimize potentially hazardous conditions. Assuming that visitor use continued to increase in the canyon, there would be a minor, long-term increase in the number of people exposed to flood hazards.

Maintaining the Zion Lodge and Birch Creek developments would have minimal effect on natural floodplain values.

River restoration actions could include removing the levee and riverbank protection structures along portions of the North Fork or allowing the structures to deteriorate. These actions would eventually subject the existing infrastructure in the fluvially active zone to greater risks. The road would become the new limit to lateral migration of the river. From time to time, the river would approach and threaten the road and riverside trails, which would periodically require the armoring of the road grade and trails with natural materials to preserve riparian function and aesthetic values. Park personnel would need to relocate some water and sewer pipelines. At some point, the river also would threaten the footbridges for the Grotto and Emerald Pools trails, and park managers would need to evaluate alternative means of access to these trails.

The restoration of the natural river morphology along portions of the river would allow flood waters to overflow onto the adjacent floodplain. Overbank flows serve important hydrologic and ecological functions, such as providing conditions necessary for riparian vegetation growth, slowing and storing flood flows for later release, and raising groundwater levels. The river would have the opportunity to develop the meandering, riffle-pool morphology typical of rivers in low-gradient alluvial valleys. Associated river and floodplain resources including riparian/wetland

vegetation, floodplain forests, Virgin spine-dace and other native fishes, and potentially southwestern willow flycatcher habitat would also benefit. Because of the importance of these resources and their very limited occurrence in the park, river restoration would be a major, long-term, beneficial effect.

Cumulative Effects. Many of the existing facilities and virtually all of the approved transportation system developments would be within the probable maximum floodplain. These facilities do not affect the natural floodplain values, except for minor effects on groundwater recharge from impervious surfaces.

Past channelization throughout the North Fork floodplain, along with other past agricultural and grazing impacts, have all contributed to a more narrow, incised, less meandering channel, with minimal overflow capacities. Use and development activities south of the park also have altered much of the North Fork's floodplain and associated natural values. Because of past modifications to the river, the measures to restore floodplain processes and associated natural values to portions of the river would create a moderate, long-term, beneficial cumulative effect to the North Fork.

Conclusion. There would be a minor increase in the level of development (addition of picnic sites) in the probable maximum floodplain and a minor increase in the number of people within the floodplains. The flood warning system and public awareness efforts would reduce flood risks to people. If use continued to increase in the canyon, there would be a minor, long-term increase in the number of people exposed to flood hazards.

The proposed action would have a moderate to major, long-term, beneficial effect on natural river processes and other natural floodplain values within the park and along the lower North Fork.

The planning team has prepared a statement of findings for the proposed action, which is included in appendix H. This statement is in accordance with National Park Service guidelines for compliance with Executive Order 11988 (Floodplain Management). The NPS guidelines call for preserving floodplain values and minimizing potentially hazardous conditions associated with flooding.

Riparian/Wetland Communities

Analysis. The restoration of dynamic floodplain processes along portions of the North Fork in Zion Canyon would allow overbank flows that deposit sediments and provide disturbance necessary for the reproduction of cottonwoods and other riparian vegetation. These flows would support the establishment of vegetation that could replace the current aging overstory. Over the long-term, multi-aged and more structurally diverse tree stands would be present, which would be a moderate, long-term, beneficial effect for plant and animal riparian communities along the North Fork.

Recreational use along the North Fork is currently quite high and would likely increase. Trampling and localized loss of riparian vegetation would occur, primarily near the developed areas and head of the canyon and the Narrows. With increased visitor management efforts developed as part of the water resource management plan (such as increasing visitor education, designating water access points, regulating use levels, and timing use) and the possible revegetation of portions of the banks and floodplain of the North Fork, only minor effects on riparian vegetation would likely occur from increased use.

Riparian communities elsewhere in the park are relatively intact. Impacts on riparian understory vegetation in localized areas along the creeks from continued or increased use in canyons in the backcountry would be

negligible to minor. Limiting use through the permitting system and taking other management actions (e.g., developing standards to further protect resources) to maintain zone conditions would minimize the potential for greater, widespread impacts. Other mitigation would include on-site reclamation, visitor education, and improvements to trails.

Cumulative Effects. The management plan for the North Fork would address the specific strategies for protecting and restoring the river and its associated floodplain. These strategies include actions to address the invasion of exotic species and browsing by a large population of mule deer (which could inhibit regeneration of riparian vegetation).

In the southwestern United States, large-scale loss and modification of riparian habitats have occurred due to urban and agricultural development, water diversion and impoundment, channelization, livestock grazing, off-road vehicle and other recreational uses, and hydrological changes resulting from these and other land uses. The park represents a significant portion of the upper Virgin River watershed. The protection and improvement of riparian habitat in the park would have a positive, long-term, moderate cumulative impact on riparian areas within the watershed.

Conclusion. Overall impacts on riparian communities within the park from recreational use would be negligible to minor. The restoration of riparian habitat along the North Fork would be a moderate, long-term, beneficial impact. Incrementally increasing riparian acreage in the park also would be a moderate beneficial effect on riparian areas within the watershed.

Hanging Gardens

Analysis. As in the no-action alternative, some hanging gardens within Zion Canyon, such as along the Riverside walk, would

continue to be susceptible to potential impacts from visitors. Impacts on hanging gardens occur primarily when people run their hands across the area, inadvertently removing vegetation. Visitors also may rub Zion snails off the surface of the hanging gardens during certain times of the year. With mitigation (e.g., barriers, placement of trails, visitor education), damage or loss of vegetation would be limited, resulting in minor, short-term, adverse impacts on the gardens.

In the proposed action, hanging gardens in four locations would be in research natural area zones. This designation would afford additional protection to the gardens in that very few people would have access to them.

Cumulative Effects. Past human impacts on several hanging gardens have been substantial, but have been mitigated with the use of trails and barriers that prevent contact with the gardens. Consequently, although several hanging gardens have been readily accessible, loss of vegetation has been minor. With continued use of mitigation measures, cumulative adverse impacts on hanging gardens would be minor and short term.

Conclusion. The proposed action would have a long-term, positive effect by zoning four locations that contain hanging gardens as research natural areas. There would continue to be the potential for visitors to adversely affect other hanging gardens, but with mitigation measures, damage or loss of vegetation would be limited to minor, short-term, adverse impacts.

Microbiotic Crusts

Analysis. Continued or increased use and the construction of new buildings, picnic areas, and trails in microbiotic crusts would result in the long-term loss of soils or disturbance from erosion and soil compaction. Development would remove microbiotic crusts where they occurred, and once compacted and eroded,

microbiotic crusts would be damaged and difficult to reestablish. In general, trails provide sufficient direction, and people tend to remain on them, as long as the trails adequately support the number of people using them at one time (i.e., by people wanting to walk side by side, pass slower hikers, or pass oncoming hikers) and direct people to popular viewing areas. Even with adequate trails, a small percentage of people would walk off of them resulting in damage to soils.

Soil disturbances and extensive loss of microbiotic crusts from development and people walking off-trail would be greatest in the areas that are zoned frontcountry high development, front country low development, transition, and administrative. These zones allow higher levels of use and more concentrated development than pristine, primitive, or research natural area zones. To minimize impacts, the Park Service would locate new developments in previously disturbed areas or away from microbiotic crusts where possible. Monitoring and mitigation measures, such as erosion controls, placement of barriers, signing, or rehabilitation efforts, would help to minimize disturbance to crusts from trail erosion or social trailing in specific areas. However, even with mitigation measures, moderate to major, localized disturbance to soils would still occur in areas with developments and high use levels — primarily along the east entrance and Zion-Mt. Carmel Highway, Kolob-Terrace Road, Kolob Canyons Road, and lower Zion Canyon.

Zones that allow for little development (primitive) or no development (pristine and research natural areas) would be relatively large in the proposed action. Therefore, park managers would be able to locate trails and campsites in areas that would be less likely to impact microbiotic crusts, although people hiking off trail in these zones would still cause soil impacts. Because visitor numbers would be relatively low in these zones, the potential number of off-trail hikers or number of hikers

in areas without trails would be reduced, thus causing minor soil impacts.

Cumulative Effects. In general, many of the soils in the park have recovered from the effects of past grazing, farming, and logging. Permanent loss of microbiotic crusts has occurred in areas of development, such as roads, trails, and buildings. However, most of the approximately 75,000 acres of park lands that likely support microbiotic crusts would not be subject to disturbance. Because of the limited and localized extent of new impacts, this alternative would have a minor, adverse cumulative impact.

Conclusion. Localized, moderate to major, long-term impacts on microbiotic crusts would be likely in areas of extensive development and use. Additional areas would be impacted from new development in some frontcountry areas, primarily along the east entrance and Zion-Mt. Carmel Highway, Kolob-Terrace Road, Kolob Canyons Road, and lower Zion Canyon. But most park lands likely supporting microbiotic soils would not be subject to disturbance. From a parkwide perspective, impacts on microbiotic crusts would be minor, based on the limited and localized extent of the impacts in relation to the widespread occurrence of these crusts in the park as a whole.

Virgin Spinedace

Analysis. Restoring portions of the North Fork below the Temple of Sinawava would allow the river to develop a meandering, riffle-pool morphology. These conditions would be typical of natural river conditions with which Virgin spinedace and other native fishes have evolved. More and deeper pools would be available to fishes. Shoreline habitat improvement could create new larval nursery areas. Overbank flows would contribute to conditions necessary for riparian vegetation growth, in turn providing nutrients, cover, and water

temperature regulation, which benefit the aquatic environment for fishes. There would be a minor to moderate, long-term improvement to habitat along portions of the North Fork.

River restoration measures that involve physical manipulation or disturbance to the riverbanks or bed would result in short-term increases in turbidity and sedimentation. Spinedace do survive periods of increased turbidity that may last several days to weeks. However, being sight feeders, they would likely be negatively affected by extended periods of high turbidity. The sedimentation of spawning beds could also be a problem. Time limitations on instream disturbance activity and avoidance of spawning periods would keep restoration impacts at negligible levels. Erosion of exposed banks during restoration would likely occur during flood events when sediment loads and turbidity levels were naturally high. The revegetation of banks would mitigate any long-term erosion.

A recent study indicated that river recreational use was disturbing fish communities within Zion Canyon (Sappington 1998). The study showed that there was lower community diversity and abundance of species, particularly for younger fish, within areas with high levels of recreational use. A separate study showed that areas of high recreational use decreased invertebrate biomass (Stanford and Shakarjian 1998). The ability of the spinedace to feed would continue to be affected by turbidity in high recreational use areas within the transition zone.

Even moderate flash floods appear to reconfigure stream channel habitats altered by recreationists and redistribute fish throughout the river. However, an important factor in community recovery after disturbance is the presence of nearby colonizing populations. An increase in the extent of recreational disturbance would potentially have major long-term effects on the population. Increased visitor

management efforts developed as part of the river management plan (such as increasing visitor education, designating water access points, regulating use levels and timing use, and restricting high use areas to present locations) would minimize the potential for new impacts and potentially enhance the population within disturbed areas. For example, restricting recreational use during spring spawning season could enhance reproductive success. Also, reducing disturbance to shallow water nursery areas could enhance survival of larval fish. Consequently, increased visitor management would result in minor to moderate, long-term benefits to the North Fork spinedace population, depending on the extent and type of management measures implemented.

Negligible to minor impacts on spinedace populations are likely to occur elsewhere in the park. Allowing public use within Parunuweap Canyon would tend to have negligible adverse effects on the East Fork spinedace population. Potential indirect effects from trampling riparian vegetation or increasing turbidity during river crossings would be negligible because of the low levels of use allowed in the pristine zone combined with significant use regulations. Similarly, with very low use levels allowed along North Creek, negligible impacts would likely occur to the spinedace habitat. No recreational use impacts would be likely in the Shunes Creek area due to its designation as a research natural area, although negligible to minor impacts from research and educational use would occur. Depending on the structures that divert water from Shunes Creek under an existing private water right, spinedace populations there could be temporarily negatively impacted. The Park Service is assessing impacts of this action in a separate environmental assessment.

Cumulative Effects. The implementation of the Virgin spinedace interagency conservation agreement would reduce significant threats to

the species and protect/enhance specific reaches of occupied and unoccupied historic habitat throughout the watershed. The improvement of occupied habitat along the North Fork within the park would support the objectives of the agreement. Because the native fish community of the Virgin River drainage (including spinedace) occurs in historic levels of abundance only in the park and a short distance downstream (Gregory and Deacon 1994, Valdez et al. 1990), it is important to minimize further disturbance in this area (Williams and Deacon 1998). Consequently, minimizing impacts through greater management of recreational use, as well as improving habitats through river restoration (as part of the river management plan), would provide increased protection to the North Fork population. This would be a major, long-term, beneficial effect.

The Zion National Park Water Rights Settlement Agreement of 1996 protects native fish species against changes in flow and thermal regimes caused by upstream water developments. Land use upstream of the park also may affect the water chemistry/sediment load in the North and East Forks. However, upstream perturbations apparently have not had serious adverse effects on the fish community in the park, and substantial changes in land uses or alteration of the landscape (e.g., widespread logging or mineral extraction) are not imminent. Park staff would work with other agencies and private landowners to minimize effects on park resources. A long-term water quality monitoring program also would allow for the early detection of potential impacts.

Conclusion. Although turbidity would continue to affect spinedace feeding in high recreational use areas along the North Fork, increased visitor management would minimize the potential for new impacts. River restoration measures could result in some negligible, short-term increases in turbidity, but in the long term, the river restoration measures would potentially enhance the spinedace

population within disturbed areas. Therefore, the proposed action would have a minor to moderate, long-term benefit to the North Fork population. Impacts on spinedace populations elsewhere in the park would be negligible to minor due to low or restricted use levels. There would be a major, long-term cumulative benefit due to further protection and potential enhancement of the park's spinedace population.

Mexican Spotted Owls

Analysis. As noted under the no-action alternative, owls may be disturbed by the presence of people or human activities. Little is known about recreational use impacts on spotted owls. Additionally, spotted owls are difficult to study or monitor, particularly so in Zion National Park, because of the rugged topography. Park managers have begun monitoring owl nesting activity and productivity in territories where impacts would more likely occur.

Under the proposed action, most new focused visitor facilities, parking areas, and campgrounds would not be built in any known owl territory within the park; picnic sites and short nature trails in owl territories along the Zion-Mt. Carmel Highway could be built, however. Park managers have not yet determined specific locations for these developments, but would locate picnic areas in previously disturbed sites along the road. Some of these existing pullouts are within two owl territories. The nature trails also could be near canyons that are fairly accessible from the road in these owl territories. To avoid impacts on these owls, park personnel would evaluate specific picnic area and trail locations on a case-by-case basis prior to construction, in consultation with the U.S. Fish and Wildlife Service. Picnic areas and trails would be located to discourage visitation into the canyons owls are known to use, and would not build these facilities during the breeding /

nesting season (March 1 – August 31). Designating the canyons near the road that were used by owls as primitive zones and the rest of the area north of the road as pristine or primitive zones and taking appropriate management actions to maintain zone conditions also would keep visitor numbers at very low to low levels.

Very popular trails pass through three owl territories associated with side canyons off of the main Zion Canyon, below the Temple of Sinawava. Increased use of these trails over existing levels is likely. If the results of monitoring recreational impacts warrants, portions of these trails where owls typically were found would be closed or signs would be added to keep people on the trail and out of side canyons frequented by owls during the spotted owl breeding/nesting period, March 1 – August 31. Park personnel would enforce closures. These measures would mitigate potential effects from increased visitation in these areas.

All of the other known spotted owl territories are in areas zoned as research natural areas, pristine areas, or primitive areas. These zones allow only limited educational or research use, or very low to low levels of recreational use. Group size in these zones would be less than eight; hiking would typically occur during the day and take people in and out of an owl's presence relatively quickly.

Low levels of use may affect the behavior of some owls, but most spotted owls appear to be relatively undisturbed by small groups (12 or fewer people) passing nearby (USFWS 1995). A more serious threat of disturbance probably arises where there is steady hiking traffic. Limitations on use levels and groups encountered per day in the pristine zone (0) and primitive zone (less than 12) would indirectly serve to limit frequency of use and avoid steady hiking traffic. No new designated camping sites would be located in owl territories, although dispersed camping in pristine

and primitive zones would continue to be allowed. Assuming that a variety of locations would be used for dispersed camping, there would be a low probability of repeated camping in locations near a nest or roost site.

If future surveys indicated that visitors were camping near identified nest or roost sites, camping would be restricted in these locations. Monitoring of owl nesting activity and productivity would continue to assess potential impacts. If necessary, park staff would restrict visitor use to mitigate visitor impacts on spotted owls.

Cumulative Effects. The Zion Canyon shuttle system would be the only action that potentially could result in a cumulative impact. The Zion Canyon transportation system planning process evaluated the implementation of a canyon shuttle system and the construction of shuttle stops, with the associated increased use of trails through side canyons supporting owl territories. That process identified trail closures, noted above, as a way to mitigate the effects of increased use. No cumulative effects are likely.

Conclusion. With close consultation with the U.S. Fish and Wildlife Service and the application of mitigation measures, the proposed action would not likely adversely affect the productivity of known spotted owl territories.

Desert Bighorn Sheep

Analysis. Under the proposed action, limited recreational use in Parunuweap Canyon (a pristine zone) and limited educational or research use in Shunes Creek (a research natural area) would be allowed. These are the only areas in the park used by sheep for lambing. Lambing areas are relatively low along the canyon sides. The proposed closure periods would prohibit visitors from being in these areas during the lambing period.

Negligible to minor impacts from sheep research activities could occur.

Spooking of sheep takes place when people startle sheep while they are feeding. Allowing visitor use within Parunuweap and adding trails or routes in canyons north of the Zion-Mt. Carmel Highway would promote increased recreational use in sheep foraging areas. Park managers would closely regulate visitor and administrative use, however, to minimize potential impacts on resources within the Parunuweap Canyon, including sheep. They would also highly regulate visitor use of side canyons, where water seeps, to avoid disturbing sheep access to these water sources. (Sheep typically use seeps in side canyons because they are close to steep escape terrain.) The visitor use closures during the lambing season would also prevent the disturbance of feeding sheep for half of the year. Some minor periodic disturbance may occur in the canyon during the nonlambing season, primarily in the fall when sheep come to the East Fork to drink.

Under the proposed action, picnic sites and short nature trails could be built along the Zion-Mt. Carmel Highway, which could disrupt sheep crossings. However, sheep would likely habituate to this increased activity and impacts would be negligible.

The remaining sheep foraging habitat in the park would be in pristine or research natural areas. Zoning Shunes Creek as a research natural area would allow only limited educational and research use. Disturbance of sheep there would be negligible. Zoning Gifford Canyon, an important high use area for sheep, as a pristine area also would limit and slightly reduce visitor use, resulting in a minor, long-term benefit.

Cumulative Effects. There would be no cumulative impacts on this species. They may potentially be affected, should air tours occur over sheep range in the park. The Park Service

would prepare an air tour management plan to address this use and potential impacts on sensitive wildlife such as sheep.

Conclusion. Negligible to minor impacts on lambing areas from sheep research activities could occur. Visitor disturbance to foraging areas would be negligible to minor because the pristine and research natural area zones would allow only very low levels of use. Opening Parunuweap Canyon to public use would have the potential for adversely affecting desert bighorn sheep. But with the very low use levels and the proposed restrictions (i.e., seasonal closures, highly regulated use of side canyons) there would likely be only negligible to minor impacts on sheep in foraging areas. There would be a minor benefit to sheep from limiting and reducing use in Gifford Canyon, an important sheep use area.

VISITOR EXPERIENCES AND USES

Natural Sounds

Analysis. Noise impacts under the proposed action would be similar to the impacts in the no-action alternative with the following exception: restrictions on the number of vehicles along the Kolob Canyons Road may take place in the future to fulfill zone prescriptions. The voluntary shuttle system on the Zion-Mt. Carmel Highway also would reduce vehicle traffic. These actions would reduce noise impacts to a minor degree compared to the actions of the no-action alternative.

Cumulative Effects. The implementation of the Zion Canyon transportation system would moderately reduce mechanical noises from vehicular traffic. This reduction in noise in combination with the reduction of some other noise sources in the canyon would result in an overall moderate, long-term, positive effect. But if aircraft flights increase over the park,

the noise of the aircraft in combination with increased use levels in frontcountry areas could result in a negative cumulative impact on natural sound levels.

Conclusion. In most of Zion National Park, natural sound levels would continue. If use levels continued to increase, there would be a moderate increase in noise impacts, which would mask natural sounds in the Zion-Mt. Carmel Highway and the Kolob Canyons and Kolob-Terrace frontcountry areas. If vehicle use decreased on the Kolob Canyons Road, there would be a minor reduction in noise levels. The implementation of the shuttle system on the east side of the park also could result in a minor reduction in noise levels.

Range of Visitor Experiences and Activities

Analysis. Under this alternative, seven different management zones would be applied to the park, which would help maintain the range of visitor experiences now offered at Zion. Applying zones to the park should have a positive effect on the visitor experience. Even if use levels continued to increase, visitors who sought solitude and natural quiet should be able to find remote wildlands to enjoy, while other visitors who sought a more social and developed experience should be able to find opportunities in the frontcountry.

With most of the park zoned pristine, visitors would have opportunities for a high quality wilderness experience. Most visitors who ventured into these areas would likely have a positive experience.

Due to use limits, some visitors may not be able to hike trails and routes in the primitive and pristine zones (including the Middle Fork of Taylor Creek, La Verkin Creek, and the northern part of the Narrows) when they want to, and they may have to change the timing of their trip or go elsewhere in the park. Most of these visitors would likely still have a positive park experience, however. But for a small

group of visitors, the management actions in this alternative would likely have a moderate, negative impact — any restrictions that affect personal choice and access would be seen by some as detracting from their park visit.

Although a small part of the park would be a primitive zone, backcountry visitors still could find opportunities to enjoy Zion's wildlands via trails and routes. With a few additional trails and routes being added under the proposed action, visitors would have opportunities to access some areas that have never or seldom been used. This alternative should have a moderate, positive effect on these visitors.

Most visitor use would continue to be focused in the park's frontcountry. However, the development of short nature trails and visitor facilities would provide new opportunities for more visitors to see and enjoy more of the park than they now can. Thus, this alternative would have a positive, moderate effect on most visitors in the frontcountry.

With one exception, horseback riders would continue to find the same opportunities to ride in the park under the proposed action as they do now. Under the zoning scheme, horseback riders would no longer be permitted in the upper Coalpits Wash, but this restriction would affect less than one percent of the areas now open to horseback riding.

As noted in the alternative, a commercial services plan would be prepared to determine if the National Park Service should permit guided activities in Zion. If permitted, areas that could be open for guided activities would be very limited due to zoning. The impacts of guided activities would be assessed as part of the commercial services and wilderness management plans.

Access into the park also affects the range of visitor experiences. Acquiring access easements would ensure that visitors could

continue to use several popular trails and routes that passed through private land. If these access routes were closed to the general public, visitors would not be able to visit some of these areas and would have to travel longer distances to access other areas. This circumstance would decrease the likelihood that visitors would use those routes and would decrease visitors' appreciation and enjoyment of park resources. Thus, the acquisition of access easements would have a major, positive impact on visitors using those routes.

Kolob Canyons Road — Under the proposed action, visitors would experience slightly more opportunities for hiking, interpretation, and picnicking in the Kolob Canyons area. For example, park personnel could improve parking lots, install restrooms, or add focused visitor facilities. These changes would increase visitor comfort and provide better resource education and greater possibilities for visitors to understand the park's significance. These changes also would help visitors locate and use facilities more easily and potentially encourage more and longer visitation of the Kolob Canyons area. For those visitors who valued a more structured experience with basic facilities and services, these changes would have a minor, positive impact on their experience. For those visitors who preferred more rustic and primitive facilities, these changes would have a minor, negative impact on their experience of the area.

If visitation to the Kolob Canyons area increased or if visitors stayed longer, crowding and noise levels associated with visitation could increase (e.g., voices, car noises). The degradation of park resources also may occur, such as increased litter and erosion and the formation of more social trails. These changes would have a minor, negative impact on those visitors who value natural quiet, solitude, and viewing park resources in a natural state.

If visitation increased substantially, park managers could limit the number of vehicles

allowed on the road (and concomitantly on the trails). This action could inconvenience visitors by limiting when they could access the road in their vehicles. On the other hand, visitors would be assured of a more rural experience, and crowding and noise would be moderated.

Kolob-Terrace Road and Lava Point — Visitors would experience a slightly more structured frontcountry area than now. Under this alternative, there would be more opportunities for picnicking, better parking facilities, more campsites at Lava Point, and easier access to trailheads. Adding campsites and possibly making water available at Lava Point might attract more campers to this area. Additional interpretive opportunities (i.e., focused visitor facility, nature trails) could increase resource education and protection and increase visitor awareness of park significance. These changes would have a minor, positive impact on those visitors who valued a more structured experience. For those visitors who valued a more primitive and rustic experience, these changes would have a minor, negative impact.

If visitation to the Kolob-Terrace Road and Lava Point area increased or if visitors stayed longer, noise levels associated with visitation, such as voices and car noises, could increase, and there would be less opportunities to experience solitude. Some degradation of park resources also may occur. This would have a minor negative impact for those visitors who valued natural quiet and solitude, and viewing park resources in a natural state.

The construction of a focused visitor facility on BLM lands along the Kolob-Terrace Road would have a minor, positive effect on the visitor experience. Visitors would have opportunities they do not currently have to see exhibits, talk with park staff, and learn about the park and its resources. The facility also would be far more convenient for visitors who needed permits — visitors could get permits

here rather than drive out of their way to the visitor center in the main Zion Canyon. The office also would enable park personnel to react faster to emergencies in this part of the park.

South entrance and the main Zion Canyon — The implementation of the actions in this alternative and the shuttle system would create a more formalized visitor experience in Zion Canyon. For example, park managers would improve most of the Zion Canyon trails (zoned transition) and develop more interpretation. Visitors would be able to find and use trails more easily and would have more opportunities to learn about park resources and park significance. These actions could encourage more visitors to use and enjoy the canyon's trails. Thus, the proposed action would have a moderate, positive impact on those visitors who valued a slightly more formalized park experience and comfortable access to park resources.

The possible addition of more picnic areas in the canyon would provide more opportunities for picnicking in Zion Canyon. Because picnic facilities already exist in the canyon, this action would have a minor, positive impact on those visitors who wished to picnic in Zion Canyon.

The restoration of portions of the North Fork of the Virgin River would provide visitors a chance to experience these portions of the river in a more natural state. However, during the restoration work, visitors might not be able to do their activity of choice (e.g., hike, wade or swim) in the location and time of their choice. The extent and intensity of these effects would depend on the river restoration methods. These potential impacts will be analyzed at a later time as part of the river management plan.)

East entrance and the Zion-Mt. Carmel Highway — Development of focused visitor facilities at or near the east entrance would

improve orientation and facilitate trip planning for visitors arriving at Zion National Park from the east. These visitors would be less likely to miss park destinations and attractions because of a lack of information. The facilities would provide conveniences for visitors including restrooms, backcountry permits, and an understanding of the Zion Canyon shuttle system. Visitors also would have additional opportunities to learn about Zion's significant resources and primary interpretive themes before driving through the park to the south entrance and transportation center. Better education about the park's resources would lead to increased visitor understanding and enjoyment of the park and enhanced protection of the resources. This would have a moderate, positive impact on the experiences of visitors arriving through the east entrance.

Because the area around the east entrance and the Zion-Mt. Carmel Highway itself would be zoned frontcountry high and low development, visitors potentially would have more opportunities for and improved access to interpretation, picnicking, hiking, and learning about park resources in this area of the park. Increased contact with park resources and additional interpretive opportunities could increase visitor understanding of, appreciation for, and enjoyment of those resources. Unlike Zion Canyon, these opportunities would be accessible with a private vehicle. This would have a moderate, positive impact on the experience of park visitors, particularly those interested in accessing facilities without having to use shuttles.

Although the operation of the Zion Canyon shuttle could increase traffic on the park's east side, the initiation of a voluntary shuttle service along the Zion-Mt. Carmel Highway would provide visitors with another option for reaching attractions on the east side. The shuttles might reduce traffic on the Zion-Mt. Carmel Highway, compared to the no-action alternative, providing a less crowded, quieter, and safer experience for visitors driving or

biking on the road. If traffic were reduced, it would allow visitors hiking in the vicinity of the highway to experience quieter conditions. The shuttle also would provide a convenient service for visitors who wanted to do one-way hikes to or from the eastern part of the park, or for groups of visitors who wanted to split up. Overall, the operation of this voluntary shuttle would have a minor, positive impact on visitors utilizing the Zion-Mt. Carmel Highway.

Other frontcountry areas — Park managers would provide new trailheads for improved access to the East Rim and East Mesa, and thus greater opportunities for visitors to experience different park areas. Increased contact with park resources would increase visitor understanding of, appreciation for, and enjoyment of those resources. This would have a moderate, positive effect on visitors in this part of the park.

Proposed wilderness — The proposed action to upgrade some trails and to provide some new primitive trails and routes would have a positive effect for visitors. As a result, more visitors could gain access into part of the proposed wilderness area and see parts of the park they likely would not have otherwise seen. The use limits would also result in fewer encounters with other visitors, which would have a positive effect on visitors who sought solitude and natural quiet. Thus, the proposed action would have a moderate, positive effect on many visitors who wanted a wilderness experience at Zion and were willing to be flexible.

Parunuweap Canyon would be open to small numbers of visitors under certain conditions, providing a new high quality educational visitor experience. Those visitors who entered Parunuweap would experience intimate contact with spectacular resources that would help them understand Zion's significance. This would have a moderate, positive impact

on the experiences of those visitors permitted to enter Parunuweap.

The proposed action also would have several negative impacts on visitors who wanted to enter the proposed wilderness area. Under this alternative, park personnel would manage 12 trails and routes for lower levels of use now or in the future, including several of the park's popular trails (e.g., Middle Fork of Taylor Creek, La Verkin Creek). Use limits and maximum group sizes could mean that some visitors might have to change their destination, the timing of their trip, or the number of people in their party. This could be a minor inconvenience or a major inconvenience, if a visitor was only in Zion for a short period of time and was expecting to be able to access a specific area. For those visitors who valued choosing where and when they wanted to go, this alternative would have a moderate, negative impact. There also would be some potential inconveniences prior to entering the proposed wilderness, such as having to obtain permits, make reservations, and perhaps change the dates or destinations of their trip.

Visitors who sought an experience devoid of trails, routes and people would be negatively affected by the addition of trails and routes in this alternative. Also, some visitors who wanted to go to Parunuweap and were turned away may feel this is a detraction from their park experience.

Research natural areas — Approximately 5,168 acres of Zion's proposed wilderness would be research natural area zones and therefore open only to guided educational trips and research. These areas currently receive little or no recreational use. As a result, managing these areas as research natural areas (and therefore prohibiting public recreational use) would have a negligible impact on most visitors' experiences. Designating Goose Creek as a research natural area would displace a few people and likely adversely

affect their experience, but these people could find other suitable areas in the park to visit.

Scenic Views— As in the no-action alternative, most of the park's viewshed would continue to appear natural to most visitors. Acquiring conservation easements outside the park, and thereby limiting the amount and kinds of development that could occur, would ensure the preservation of the scenic resources of the areas involved. Visitors could continue to experience views of these areas without scenic impairments. This would have a moderate, positive impact on visitors who experience those viewsheds.

Several new facilities potentially developed within Zion National Park could affect scenic views, including new facilities at the east entrance; an expansion of the Kolob visitor center; new picnic sites, campsites, and restrooms; and improved parking areas. It was assumed that the impacts of these developments on views would be minimized through appropriate facility design and landscaping. Still, these developments would have a minor, negative impact on the experiences of visitors who valued a less developed visual scene.

Cumulative Effects. The increased management of backcountry use and the potential restriction of private vehicles on the Kolob Canyons Road, taken in conjunction with the operation of the Zion Canyon shuttles, would create a more structured visitor experience at Zion National Park — visitors would have fewer personal choices to go when and where they want. However, the shuttles would also ensure that visitors could stop at major attractions in the Zion Canyon without having to compete for parking spaces. The extent of the impacts on visitors would depend on the decisions of several subsequent plans including the VERP implementation plan, the wilderness management plan, the commercial services plan, the climbing/canyoneering management plan, the river management plan, and the transportation plan.

The new developments proposed in this alternative, together with the operation of the Zion Canyon shuttles, are likely to result in increased use levels over time in other frontcountry areas, including the Kolob Canyons Road, Kolob-Terrace Road, and the Zion-Mt. Carmel Highway. As overall park visitation increased, visitors may experience more crowding and noise and observe more resource impacts at the facilities and trails in these frontcountry areas. The changes would likely occur slowly, but would eventually have a moderate, negative cumulative impact on those visitors who wished to experience solitude, quiet, or a "rustic" park experience in frontcountry areas. There is also the potential for increased day use of trails going into the wilderness area from these roads. Although the Park Service would limit use levels in the primitive and pristine zones, some unauthorized day use may occur in these areas.

Conclusion. Under the proposed action, the existing range of visitor experiences would be maintained. Zoning most of the park as pristine would help ensure that visitors have many opportunities to experience solitude, quiet, and a feeling of being immersed in pristine resources throughout the park's proposed wilderness. Visitors' opportunities to have contact with and learn about park resources in the frontcountry would be enhanced. A few new opportunities would be provided for visitors to experience parts of the proposed wilderness, including Parunuweap Canyon, which would have a moderate, positive impact on visitors. Placing limits on use levels on some trails also would enhance opportunities for enjoying solitude and experiencing natural sounds. On the other hand, use levels on several trails would be reduced now or in the future. Some visitors may feel their personal choices and access to a large portion of park resources were being somewhat curtailed in the proposed wilderness area, which would have a moderate negative impact on their experiences. Overall, the

proposed action would be expected to have a moderate, positive effect on the range and quality of most visitors' experiences in Zion's front and backcountry.

Visitor Experiences in Other Recreational Areas Nearby to the Park

Analysis. Visitors who could not access the area of their choice at Zion might choose to go to other recreational areas. Similarly, if park managers restrict private vehicles on the Kolob Canyons Road, visitors might choose to visit other areas instead of Zion. This would likely have a negligible impact on the visitation at other nearby recreational areas because not very many people would tend to be displaced.

Cumulative Effects. Although some people would likely be displaced to other state and federal recreational areas as a result of the actions taken in this alternative, the overall number of displaced people is not likely to be large. Even if many of these people chose not to go to Zion or decided to cut their trips short, many of the displaced visitors would still be visiting these other recreational areas as part of their "Grand Circle" vacations. Thus, the proposed action would have a minor, negative cumulative effect on visitors' experiences in other nearby recreational areas.

Conclusion. With increased visitor use management, visitors would likely be displaced from Zion to other nearby recreational areas. The number of displaced visitors is not expected to be large, however. Thus, the proposed action would likely have a minor, negative effect on the experiences provided at nearby recreational areas.

THE SOCIOECONOMIC ENVIRONMENT

Analysis. Under the proposed action, visitor use would likely continue to increase in line

with recent experience at the park. With increased visitor use, some business activity in the local area may increase. This would result in increased positive benefits of a moderate to major degree for a small number of firms and/or individuals for the short and long term (if the increased business activity could be sustained).

In addition, during the life of this plan, new developments would or could occur, which would provide some moderate to major, positive, short-term, economic benefits for a limited number of individuals and the enterprises involved with the developments. These recommended improvements would not all occur at one location or at the same time. The distribution of these developments through time and space would spread out the overall beneficial, economic impacts of these projects.

Economic opportunities within the park would be guided by a commercial services plan. These activities would create a moderate to major source of positive, short- and long-term economic benefits for a few persons and firms. The park would continue to provide the basis for the local tourism industry served by the private sector situated outside of the park. The effect on the local economy in terms of population, employment, income, etc., would be a negligible to minor, positive impact due to the relatively large size of the local economy compared to the actions in this alternative.

The proposed action seeks access easements totaling approximately 15 miles on lands outside the park and conservation easements on three privately owned parcels totaling 2,220 acres. The acquisition of some easement rights may require the exchange of federal money. In these cases, the individual land-owners would receive a moderate, positive benefit by receiving public money, and the National Park Service would obtain a minor to moderate, positive benefit by acquiring the

sought after easements. After the exchange, the value of the lands could be altered, with the value of some lands decreasing and the value of other adjacent lands increasing. However, the net change in local tax revenue is likely to be negligible.

As in the no-action alternative, increased levels of visitors going to the park and their concurrent demands for goods and services has led the private sector outside the park to increase levels of development and economic activity. It is expected that the gateway community of Springdale will experience further development. While the built environment of this area would continue to evolve, the small town "pioneer heritage" image would be fostered and protected by the local land use plan and zoning regulations. Continued increases in visitor use of the park would likely result in more frequent congestion and associated increases in the demands placed on local infrastructure and public services (e.g., roads, water and sewer, police and fire protection, and emergency medical services) in the gateway communities, especially Springdale. However, when comparing the impacts of this alternative to those of the no-action alternative, the amount of change due to this alternative would tend to be negligible.

Cumulative Effects. Zion National Park has been a protected area since 1909. As a result of increased visitation to the park, business and residential development have increased. This growth trend has had a moderate to major, positive impact on the local/regional economy. For example, a theater/shopping complex and new motels were built in Springdale in the 1990s, providing long-term employment opportunities for Springdale residents. It is expected that the positive effects of the growth trend on the local and regional economy will continue and that this alternative will not change the ongoing trend. The implementation of the Zion Canyon shuttle system would result in additional NPS

expenditures and a positive, long-term benefit on the local and regional economy. Overall, the proposed action would be expected to have a long-term, negligible to minor, positive cumulative effect on the local and regional economy.

Conclusion. Increased visitation may result in positive economic benefits of a moderate to major degree for a small number of firms and/or individuals over both the short and long term. Various development projects would provide a few individuals and firms with short-term economic benefits that would be moderate to major (for those directly affected), depending on the level of involvement that occurred. However, in terms of the overall economy, these positive effects would be negligible to minor. Changes in cumulative impacts as compared to the impacts of the no-action alternative would be negligible. The gateway communities would likely continue to change, but they would only be negligibly different from the changes created by the no-action alternative. Overall, the proposed action would tend to have a long-term, negligible, positive change in the local/regional economy.

UNAVOIDABLE ADVERSE EFFECTS OF THE PROPOSED ACTION

Major, localized, adverse impacts on microbiotic soil crusts would continue to occur in areas with extensive development and use. Unavoidable losses of microbiotic crusts also would tend to occur in areas with new developments, primarily along the east entrance and Zion-Mt. Carmel Highway, Kolob-Terrace Road, Lava Point, Kolob Canyons Road, and the lower Zion Canyon.

The imposition of limits on backcountry use would have an unavoidable adverse impact on those visitors who might not be able to hike or camp in the backcountry area of their choice. If the number of private vehicles was limited

on the Kolob Canyons Road, visitors would be inconvenienced or would potentially be unable to experience those areas. Some people would consider any limits on visitor choice to be an unavoidable adverse effect.

RELATIONSHIP OF SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The restoration of natural processes along portions of the North Fork of the Virgin River would enhance long-term productivity of the

biological resources associated with the river and its floodplain.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES OF THE PROPOSED ACTION

Because it takes so long to form soil, the loss of soil due to the construction of new facilities (e.g., picnic areas and trails) would be an irreversible commitment of resources. No other irreversible or irretrievable commitments of resources under the proposed action are known.

IMPACTS OF ALTERNATIVE A: PROVIDE ADDITIONAL OPPORTUNITIES FOR USE AND ACCESS

NATURAL RESOURCES

Air Quality

Analysis. Air quality impacts under alternative A would be similar to the potential impacts of the no-action alternative. In general, this alternative provides opportunities for more widespread and increased visitor use of Zion. Improving access to the park and within the park could result in a moderate increase in vehicle emissions and a moderate reduction in near-range visibility.

The construction, removal, and improvement of facilities would generate particulates and machinery fumes that would result in some short-term, localized, minor impacts on air quality. Construction personnel would control dust by applying water or other palliatives; machinery would be required to meet emission standards.

Cumulative Effects. The planning team is not aware of any other actions that would have a negative cumulative impact on the park's air quality. As in the proposed action, the implementation of the voluntary Zion-Mt. Carmel Highway shuttle, combined with the Zion Canyon transportation system and other actions that minimize pollution sources in the park, would moderately reduce local emissions and improve near-range visibility.

Conclusion. Parkwide, little change would be expected in the park's air quality based on the actions in alternative A. There would be a moderate increase in vehicle emissions and decrease in near-range visibility along roads. Construction activities would result in minor, short-term, decreases in local air quality.

Water Quality

Analysis. Impacts under alternative A would be similar to the impacts of the proposed action. The construction and use of focused visitor facilities, parking areas/trailheads, picnic areas, campsites, and trails could result in minor increases in suspended sediment, turbidity, and petroleum residues in nearby streams. Construction impacts would be temporary and would be mitigated by the measures described under the proposed action. Increased turbidity would occur in localized areas where visitors eroded soils along stream banks and disturbed stream bottom sediments. Water pollution would also continue to occur from trash or human wastes deposited in or near streams. With increased use along some streams within the park, particularly along the intensively used reaches of the North Fork of the Virgin River, some localized decreases in water quality would likely occur. Similar to the efforts of the proposed action, with increased visitor management and the application of other mitigation measures, increased use would likely only lead to minor reductions in water quality.

The same effects described under the proposed action regarding river restoration activities would also apply to alternative A — the physical manipulation of the riverbanks or bed would result in moderate, short-term increases in turbidity. Increased sediment discharge would continue to occur intermittently for a few years, depending on the modifications made to the channel. However, the vast majority of this discharge would occur during flood events when the river was naturally very turbid.

Cumulative Effects. As in the previous alternatives, water pollution sources would cause negligible cumulative impacts, provided

there was cooperation between park staff, adjacent landowners, and the Utah Department of Natural Resources, and that park staff participated in the Virgin River watershed management planning process.

Conclusion. With the increased use proposed in alternative A, minor localized effects on water quality would be likely. Moderate, short-term, increases in turbidity also would occur from river restoration measures.

The North Fork of the Virgin River Floodplain

Analysis. Impacts from this alternative would be the same as those in the proposed action. There would be a minor, long-term, increase in the number of people exposed to flood hazards based on increased use in the canyon. River restoration actions would have a major, long-term, beneficial effect in the stretch of the river near the lodge.

Cumulative Effects. The potential for cumulative impacts in alternative A would be the same as those in the proposed action. Because of past modifications to the river, measures to restore floodplain processes and associated natural values would have a moderate, long-term, beneficial cumulative effect.

Conclusion. With a minor increase in the level of development and number of people within the floodplain, there would be a minor, long-term increase in the number of people exposed to flood hazards. Alternative A also would have a moderate to major, long-term beneficial effect on natural river processes and other natural floodplain values within the park and along the lower North Fork.

Riparian/Wetland Communities

Analysis. Impacts under alternative A would be similar to the impacts of the proposed action. The restoration of floodplains and

associated riparian communities along portions of the North Fork would have a moderate, long-term, beneficial effect on riparian communities. With increased visitor management efforts (developed as part of the river management plan) and possible revegetation of portions of the banks and floodplain of the North Fork, increased use would likely only lead to minor negative effects on vegetation. Under this alternative, visitor use levels in portions of the backcountry would be higher than under the proposed action. However, the application of use limits and other management actions to maintain zone conditions would minimize the potential for widespread impacts. Thus, even with increased use in the backcountry, there likely would be only negligible to minor impacts on riparian understory vegetation in localized areas.

Cumulative Effects. Cumulative impacts would be similar to the impacts of the proposed action. The protection and improvement of riparian habitat in the park would have a positive, moderate cumulative impact on riparian areas within the Virgin River watershed.

Conclusion. Overall impacts on riparian communities within the park from recreational use would be negligible to minor. The restoration of riparian habitat along the North Fork would be a moderate, long-term, beneficial local impact. Incrementally increasing riparian acreage within the Virgin River watershed, would have a moderate beneficial effect.

Hanging Gardens

Analysis. Alternative A would have similar impacts as those of the proposed action alternative. Hanging gardens within Zion Canyon, such as along the Riverside walk, would continue to be susceptible to potential impacts from visitor use. Impacts on hanging

gardens occur primarily when people run their hands across the area, inadvertently removing vegetation. Visitors also may rub Zion snails off the surface of the hanging gardens during certain times of the year. Mitigation would limit the damage or loss of vegetation, resulting in only minor, short-term, adverse impacts on the gardens.

Hanging gardens in four locations would be within research natural area zones and be afforded additional protection — because very few people could access these gardens, the potential for impacts would be minimized.

Cumulative Effects. Past human impacts on several hanging gardens have been substantial, but have been mitigated with the use of trails and barriers that prevent contact with the gardens. Consequently, although several hanging gardens have been readily accessible, loss of vegetation has been minor. With continued application of mitigation measures, adverse, cumulative impacts on hanging gardens would be minor and short term.

Conclusion. Alternative A would have a long-term, positive effect by zoning four locations with hanging gardens as research natural areas. There would continue to be the potential for visitors to damage hanging gardens that were not protected by barriers. But with mitigation, damage or loss of vegetation would be limited to minor, short-term, adverse impacts.

Microbiotic Crusts

Analysis. Alternative A would have many of the same impacts as those described under the proposed action. Continued or increased use and the construction of new buildings, picnic areas, and trails in microbiotic crusts would result in the long-term loss of soils or disturbance from erosion and soil compaction. Soil disturbances and extensive loss of microbiotic crusts from development and people walking off-trail would be greatest in frontcountry high

development, frontcountry low development, transition, and administrative zones. Even with mitigation measures, moderate to major, localized disturbance to soils would occur in areas with development and high use levels — primarily along the east entrance and Zion-Mt. Carmel Highway, Kolob-Terrace Road, Kolob Canyons Road, and lower Zion Canyon. Alternative A would have additional localized impacts from developments, such as a bike trail paralleling the Kolob-Terrace Road and additional picnic sites along the Kolob Canyons Road, compared to the proposed action.

Although alternative A would apply the primitive zone to more of the park than the other alternatives, little or no new development would likely take place in this zone. Park personnel could locate trails and campsites in areas with little or no impact on microbiotic crusts. In both the primitive and pristine zones, which would account for 92% of the park, people could hike off-trail and impact microbiotic crusts. However, visitor numbers would be relatively low, reducing the potential number of off-trail hikers or hikers in areas without trails. Soil impacts in these zones would be minor.

Cumulative Effects. In general, many of the soils in the park have recovered from the effects of past grazing, farming, and logging. Permanent loss of microbiotic crusts has occurred in areas of development, such as roads, trails, and buildings. However, most of the approximately 75,000 acres of park lands that likely support microbiotic crusts would not be subject to disturbance. Because of the limited and localized extent of new impacts, this alternative would have a minor cumulative impact.

Conclusion. Localized, moderate to major, long-term impacts on microbiotic crusts would occur in areas of extensive development and use. Areas most likely to be impacted from new development include the east entrance

and Zion-Mt. Carmel Highway, Kolob-Terrace Road (including the bike trail paralleling the road), Kolob Canyons Road (including picnic sites along the road), and lower Zion Canyon. Most of the park lands likely supporting microbiotic soils would not be subject to disturbance, however. From a parkwide perspective, the negative impacts on microbiotic crusts would be minor, based on the limited and localized extent of the impacts in relation to the widespread occurrence of the crusts in the park as a whole.

Virgin Spinedace

Analysis. Impacts would be similar to those of the proposed action. The restoration of the natural river morphology in portions of the North Fork below the Temple of Sinawava would create new larval nursery areas and support the regeneration of riparian vegetation. This would result in a minor to moderate, long-term improvement to habitat along portions of the North Fork.

River restoration measures that involve physical manipulation or disturbance to the riverbanks or bed would result in short-term increases in turbidity and sedimentation. Setting time limitations on instream disturbance activity and avoiding spawning periods would keep restoration impacts at negligible levels.

Increased visitor management efforts developed as part of the river management plan would minimize the potential for new impacts and potentially enhance the spinedace population within disturbed areas. Depending on the extent and type of management measures implemented by park personnel, increased visitor management would result in minor to moderate, long-term benefits to the North Fork spinedace population.

Negligible to minor impacts would occur on spinedace populations elsewhere in the park. Allowing public use within Parunuweap

Canyon would likely have negligible adverse effects on the East Fork spinedace population because of the low levels and high regulation of use. Very low levels of research and educational use would occur in the Shunes Creek research natural area, which also would result in negligible to minor impacts on spinedace habitat. Depending on the structures used to divert water from Shunes Creek under an existing private water right, spinedace populations there could be temporarily negatively impacted. Park managers are assessing the impacts of this action in a separate environmental assessment.

Although North Creek would be a primitive zone under alternative A, which would allow increased levels of use, spinedace extend for only a very short distance into the park along North Creek. No large increases in public use are likely in this reach because no designated trails or routes are located here, and visitors would continue to be inclined to travel farther upstream into the park. Thus, impacts also would be negligible on this spinedace population.

Cumulative Effects. Cumulative impacts would be similar to the proposed action. The minimization of impacts through greater management of recreational use and improvements to habitat from river restoration would provide increased protection to the North Fork population. This would be a major, long-term, beneficial effect.

Conclusion. Although turbidity would continue to affect spinedace that fed in high recreation use areas along the North Fork, increased visitor management would minimize the potential for new impacts. Some negligible, short-term increases in turbidity would occur due to river restoration measures, but in the long term, these measures would potentially enhance the population within disturbed areas. Therefore, there would be a minor to moderate, long-term benefit to the North Fork population. Impacts on other spinedace

populations in the park would be negligible to minor due to very low and/or restricted recreational use levels. There would be a major, long-term, cumulative benefit due to further protection and potential enhancement of the park's spinedace population.

Mexican Spotted Owls

Analysis. Like in the proposed action, most of the proposed new focused visitor facilities, parking areas, campgrounds, and picnic areas would be located outside of the park's known owl territories. However, picnic sites and short nature trails could be built in owl territories along the Zion-Mt. Carmel Highway and nature trails could be added to the lower parts of canyons, north of the road that the owls are known to use. The specific locations for these developments have not been determined, but picnic areas would be located in previously disturbed sites along the road. Some of these existing pullouts are within two owl territories.

To avoid impacts on the owls, park managers would evaluate specific picnic area and trail locations on a case-by-case basis in consultation with the U.S. Fish and Wildlife Service. They would locate the picnic areas and trails in such a way as to discourage visitation into the canyons the owls are known to use, and would not build these picnic areas and trails during the breeding/nesting season. Zoning the lower canyons north of the road that were used by owls as primitive and the upper portions of the canyons as pristine, and taking appropriate management actions to maintain zone conditions, also would keep visitor numbers at low to very low levels.

As in the other alternatives, very popular trails pass through three owl territories associated with side canyons off of the main Zion Canyon, below the Temple of Sinawava. If warranted by recreational impact monitoring data, portions of the trails where owls were

typically found would be closed or signs would be added to the areas to keep people on the trails and out of the side canyons frequented by the owls. These actions would mitigate the potential effects from increased visitation in these areas.

All of the other known owl territories are in research natural areas, pristine areas, or primitive areas. These zones allow only limited educational or research use, or allow only very low to low levels of recreational use. The zone conditions regarding group sizes and encounter levels would further limit impacts on owls in these zones. Hiking would typically occur during the day, and people would travel in and out of an owl's presence relatively quickly. Park managers would not locate any new designated camping sites in owl territories. Dispersed camping would continue in the pristine and primitive zones, but assuming that visitors used a variety of locations, there would be a low probability of repeated camping in locations near a nest or roost site. If future surveys indicated that visitors were camping near identified nest or roost sites, park personnel would restrict camping at these locations. Low levels of use may affect the behavior of some owls. Park personnel would continue to monitor owl nesting activity and productivity to assess potential impacts, and would implement visitor use restrictions if necessary.

Cumulative Effects. The Zion Canyon shuttle system would be the only action that potentially could result in a cumulative impact. As part of the Zion Canyon transportation system planning process, the implementation of a canyon shuttle system and the construction of shuttle stops, with the associated increased use of trails through the side canyons that support owl territories, were evaluated. That planning process identified trail closures, as noted above, as a way to mitigate the effects of increased use. No cumulative effects are expected.

Conclusion. This alternative is not likely to adversely affect the productivity of known spotted owl territories.

Desert Bighorn Sheep

Analysis. Like in the proposed action, park managers would allow low levels of visitor use along the drainage bottom of Parunuweap Canyon (a pristine zone) and limited educational or research use along Shunes Creek (a research natural area). In addition, under alternative A, the sides of Parunuweap Canyon would be included in a research natural area zone. With the proposed closure periods, only negligible to minor impacts from sheep research activities would occur within lambing areas.

With regard to sheep foraging areas, negligible disturbance would occur in Shunes Creek due to its zoning. Allowing visitor use within Parunuweap Canyon and adding trails or routes in canyons north and south of the Zion-Mt. Carmel Highway could promote increased visitor use in areas used by sheep for foraging. Restricting the use of Parunuweap Canyon would result in negligible to minor disturbance to foraging sheep, which would occur primarily during the fall when the sheep came to the East Fork to drink. Disturbances to foraging sheep in canyons along the highway route would be minor to moderate because the upper portions of the canyons and slopes (including important habitat in Gifford Canyon) would be within a primitive zone, where increased use levels of up to 100 people per day would be allowed.

As in the proposed action, park personnel could build picnic sites and short nature trails along the Zion-Mt. Carmel Highway. Adding these new developments in areas along the road that are currently used or disturbed would negligibly affect sheep in the vicinity of the Zion-Mt. Carmel Highway or sheep road crossings.

The potential increase in visitor use over a large portion of the sheep's range on either side of the Zion-Mt. Carmel Highway would be a minor to moderate, short-term disturbance to sheep foraging areas. It would be a major impact if the sheep were displaced from key portions of their range.

Cumulative Effects. There would be no cumulative impacts on this species. The sheep may be affected if air tours occur over sheep range in the park. An air tour management plan would be prepared to address this use and the potential impacts on sensitive wildlife such as sheep.

Conclusion. Sheep research activities could cause negligible to minor impacts on lambing areas. Visitor disturbance in foraging areas would be negligible to minor due to zone conditions (i.e., allowance of only very low levels of use), seasonal closures, and other use restrictions. Impacts on sheep would be minor to moderate in sheep habitat located within canyons along the Zion-Mt. Carmel Highway due to increased visitor use occurring over a large portion of the sheep's range on either side of the highway. It would be a major impact if sheep were displaced from key portions of their range.

VISITOR EXPERIENCES AND USES

Natural Sounds

Analysis. Noise impacts under alternative A would be similar to those in the no-action alternative. This alternative would provide opportunities for more widespread and increased visitor use of Zion. Improving access to and within the park would result in a moderate increase in noise impacts. However, in this alternative, the voluntary shuttle system on the Zion-Mt. Carmel Highway would reduce vehicle traffic, resulting in a minor reduction in noise impacts compared to the no-action alternative.

Cumulative Effects. The implementation of the Zion Canyon transportation system would moderately reduce mechanical noises from vehicular traffic. This action, in combination with the reduction of some other noise sources in the canyon, would result in an overall moderate, long-term positive effect. If aircraft flights over the park increased, however, the noise of the aircraft combined with increased use levels would result in a negative cumulative impact on natural sound levels.

Conclusion. Higher use levels in the park would lead to a moderate increase in noise impacts. Mitigation would reduce some noise sources, and the shuttle system on the east side of the park could result in a minor reduction in noise levels.

Range of Visitor Experiences and Activities

Analysis. Alternative A generally would have the same type of effects on visitor experiences and uses as the proposed action. As in the proposed action, the new management zones would have a positive effect, helping to maintain the existing range of visitor experiences. Even if use levels continued to increase, visitors seeking solitude and natural quiet should be able to find remote wildlands to enjoy, while other visitors seeking a more social and developed experience should be able to find opportunities for these types of experiences in the frontcountry.

With much of the park being a primitive zone, visitors could find opportunities to enjoy Zion's wildlands via trails and routes. With the additional trails proposed under this alternative and the development of new trailheads, a greater number of visitors would have increased opportunities to access areas that are not presently used or are seldom used. As a result, this alternative should have a moderate, positive effect on most of these visitors, who would have opportunities to enjoy high quality wilderness experiences. On the other hand, for

those visitors who sought a less-crowded experience in areas with no trails, the addition of trails or routes in previously untrailed areas could have moderate, negative effects.

Due to use limits, some visitors may not be able to hike several trails and routes (i.e., the Narrows above Orderville Canyon, Mystery Canyon) at their preferred times, and would either have to change the timing of their trip or visit other areas either inside or outside of the park. Most of these visitors would still likely have a positive park experience, however. On the other hand, a small number of visitors may feel that any restrictions that affected their personal choice and access would detract from their trip.

Under alternative A, most visitors would continue to spend their time in the park's frontcountry, staying in or near the developed areas. However, the development of short nature trails and visitor facilities would provide new opportunities for a greater number of visitors to enjoy more of the park than they can now. Thus, this alternative would have a positive, moderate effect on most visitors in the frontcountry.

Alternative A would have the same effect on horseback riders as the proposed action: horseback riders would continue to find the same opportunities to ride in the park as they do now, except that they would no longer be permitted to ride in the upper Coalpits Wash. This action would have a minor effect on horseback riding opportunities.

As noted in the alternative, a commercial services plan would be prepared to determine if guided activities should be permitted in Zion. If the plan determines that guided activities were appropriate, under alternative A, much of the backcountry could be open to commercial guiding. The impact on users would vary depending on such factors as where the guides would be permitted to operate, at what times they can operate, and how

many guides (if any) would be operating. These potential impacts would be further analyzed as part of the environmental documentation for the commercial services and wilderness management plans.

Acquiring access easements would have the same effects as those described under the proposed action — the easements would ensure that visitors could still access several popular trails and routes that currently passed through private land. Thus, this action would have a major, positive impact on visitors who used those routes.

The visitor use and experience impacts of alternative A in the south entrance and main Zion Canyon, east entrance and Zion-Mt. Carmel Highway would be the same as those described for the proposed action. The effects on scenic views and the effects of the proposed boundary adjustments also would be the same.

Kolob Canyons Road. Alternative A would have similar positive impacts as those of the proposed action regarding increased opportunities for hiking, interpretation, and picnicking. However, unlike the proposed action, there would be no limits on the number of vehicles or shuttles allowed under this alternative. If visitation increased, crowding, noise levels, and the degradation of park resources may occur (e.g., increased litter, more social trails), which would have a minor, negative impact on visitors who valued natural quiet, solitude, and the opportunity to view the park in a natural state.

Kolob-Terrace Road and Lava Point — Like the proposed action, alternative A would provide a greater number of opportunities for picnicking, additional interpretive services, better parking facilities, more campsites at Lava Point, and easier access to trailheads. These changes would have a minor, positive impact on those visitors who valued a more structured experience, and a minor, negative

impact on those visitors who valued a more primitive and rustic experience. Any increase in use as a result of the above actions could result in some resource impacts that would negatively affect the experience of some visitors. Limiting traffic or providing shuttles would reduce or eliminate these impacts, but some visitors would be adversely affected if they could not experience the Lava Point area.

Building a focused visitor facility on BLM lands along the Kolob-Terrace Road would have the same minor, positive effects on the visitor experience as the effects discussed under the proposed action. The facility would provide information to enhance visitors' understanding of the park and a more convenient place to obtain permits, as well as improve the park staff's response time for assisting visitors in need of search and rescue.

Under this alternative, a bicycle trail along the Kolob-Terrace Road to Lava Point could be developed. This trail would provide a safe, long-distance bicycling experience currently unavailable at Zion, which might encourage more bicycle riders to explore the park, enjoy its resources, and understand its significance. This action thus would have a moderate, positive impact on those visitors who rode bicycles at Zion.

Also under alternative A, the opening of the road to the east of the West Rim trailhead would provide visitors with an additional opportunity for scenic driving, during which they could come into contact with park resources. This change would have a minor, positive impact for visitors who valued opportunities for motorized sightseeing, but a minor, negative impact for visitors seeking a more rustic experience.

Other frontcountry areas — Like in the proposed action, new trailheads would be provided to improve access to the East Rim and East Mesa. An additional change under alternative A would be to improve visitor

access to the Dalton Wash area, thus providing more opportunities for visitors to come into contact with park resources. This increased contact with park resources would tend to increase visitor understanding of, appreciation for, and enjoyment of those resources, which would have a moderate, positive effect on visitors in this part of the park.

Proposed wilderness — Under alternative A, the majority of the proposed wilderness would be a primitive zone, with a smaller portion being a pristine zone. This zoning structure would provide greater opportunities for hiking on trails and utilizing designated backcountry campsites than what is available today, but fewer opportunities for experiencing solitude than what is now available. The actions of alternative A to upgrade some trails and provide several new primitive trails and routes in the proposed wilderness would have a positive effect for visitors seeking to use these trails. As a result, more visitors could gain access into and experience part of the proposed wilderness area they likely would not have otherwise visited. This would have a positive impact for those visitors who valued hiking on trails that provided opportunities for solitude in a wildland setting.

Like in the proposed action, under alternative A, park managers would open the East Fork of the Virgin River in Parunuweap Canyon to small numbers of visitors, under certain conditions. This action would provide a new high quality educational visitor experience and result in a moderate, positive impact on the experiences of those visitors who were permitted to enter Parunuweap.

Alternative A also would have some negative effects on visitors in the proposed wilderness. Some visitors would potentially be inconvenienced prior to entering the proposed wilderness (e.g., by getting permits, making reservations, potentially having to change the dates or destinations of their trip). Visitors who sought a wilderness experience free of designated

trails or routes in these areas also would feel negative impacts. Additionally, visitors who wished to visit Parunuweap but were turned away could feel this as a detraction from their park experience.

Compared to existing conditions, park personnel would manage two routes for lower levels of existing or future use — the Narrows above Orderville Canyon and Mystery Canyon. While the net effect on backcountry use would probably be negligible to minor, some redistribution of use among trails would likely occur. Use limits and maximum group sizes might mean that visitors would have to change their exact destination, the timing of their trip, or the number of people in their party. This could be a minor inconvenience, or a major one, if a visitor was only in Zion for a short period of time and was expecting to be able to access a specific area. For those visitors who valued being able to visit chosen destinations when and how they want to, alternative A would likely have a minor, negative impact.

Research natural areas — Approximately 6,263 acres of Zion's proposed wilderness would be in research natural area zones and therefore only open to guided educational trips and research. With the exception of the upper Coalpits Wash, these areas currently receive little or no recreational use. As a result, managing these areas as research natural areas (and therefore prohibiting public recreational use) would have a negligible impact on most visitors' experiences. Designating upper Coalpits Wash as a research natural area would displace a few visitors, but they probably could find other destinations in the park to visit.

Cumulative Effects. Alternative A would have the same potential for cumulative effects as in the proposed action. The increased management of backcountry use in conjunction with the operation of the Zion Canyon shuttles would mean that visitors would have less personal choice than they do today.

However, the shuttles would also ensure that visitors could stop at major attractions in the Zion Canyon without having to compete for parking spaces. The extent of the impacts on visitors would depend on the decisions park managers made for several subsequent implementation plans.

Like in the proposed action, the new developments proposed in alternative A, together with the operation of the Zion Canyon shuttles, are likely to result in increased use levels over time in other frontcountry areas, including the Kolob Canyons Road, Kolob-Terrace Road, and the Zion-Mt. Carmel Highway. As overall park visitation increased, visitors could experience more crowding and noise and observe more resource impacts at the facilities and trails in these frontcountry areas. The changes would likely occur slowly over time, but would eventually have a moderate, negative cumulative impact on those visitors who wished to experience solitude, quiet, or a “rustic” park experience in the frontcountry. There is also the potential for increased day use of trails going into the wilderness area from these roads. Although park managers would limit use levels in the primitive and pristine zones, some unauthorized day use may occur in these areas.

Conclusion. Under alternative A, park managers would maintain the existing range of visitor experiences. In the frontcountry, there would be enhanced opportunities for visitors to have contact with and learn about park resources. Opportunities for experiencing solitude, quiet, and the feeling of being immersed in pristine park resources would still be available in the proposed wilderness area. Visitors would have a number of additional opportunities to experience the park’s proposed wilderness, including Parunuweap Canyon, through primitive trails and routes. This would have a moderate, positive impact on visitors desiring those experiences.

On the other hand, the new trails and routes would result in higher encounter levels with people, which would have a negative impact on other visitors. There would be a reduction in the present or future levels of use on a few routes. Some visitors may feel their personal choices and access to park resources are being somewhat curtailed, particularly in the proposed wilderness area, which would have a moderate, negative impact on their experience. Overall, alternative A would be expected to have moderate, positive effects on the range and quality of visitor experiences in Zion’s frontcountry, and moderate, positive and negative effects on visitor experiences in the backcountry.

Visitor Experiences in Other Recreational Areas Nearby to the Park

Analysis. Alternative A would have the same effects on other nearby recreational areas as the effects of the proposed action. If park personnel restrict private vehicles on the Kolob Canyons Road, visitors might choose to visit other areas instead of Zion. This action would tend to have a negligible impact on the visitation at other nearby recreational areas because not very many people would likely be displaced.

Cumulative Effects. Like in the proposed action, alternative A would have the potential for a minor cumulative effect on the visitor experience in other recreational areas. The overall number of people who would be displaced from Zion to other state and federal areas as a result of this alternative would not likely be large. Even if visitors spent less time at Zion or chose not to visit Zion at all, many of these visitors would still be visiting these other recreational areas as part of their “Grand Circle” vacations.

Conclusion. With increased visitor use management, some but not many visitors would likely be displaced from Zion to other

nearby recreational areas. Thus, the proposed action would likely have a negligible to minor, negative effect on the experiences provided at nearby recreational areas.

THE SOCIOECONOMIC ENVIRONMENT

Analysis. Alternative A encourages increased visitor use in some areas of the park. With increased use, some business activity in the local area may increase, resulting in increased positive benefits of a moderate to major degree for a small number of firms and/or individuals involved with the activities. These benefits could occur over both the short and long term. In addition, various development projects would provide a few individuals and firms with positive, short-term economic benefits. Depending on the level of development that occurs, these benefits would be moderate to major, with the individuals and firms more directly involved with the developments experiencing greater effects. While some individuals may benefit, the overall impact on the local economy in terms of population, employment, income, and the like, would be a negligible to minor, positive impact, due to the relatively large size of the local economy compared to the actions in alternative A.

As in the no-action alternative, the increased numbers of visitors to the park and their concurrent demands for goods and services has caused the private sector outside the park to increase development and economic activity. It is likely that the gateway community of Springdale would continue to experience further development. While the built environment of this area would continue to evolve, the small town "pioneer heritage" image would be protected and fostered by the local land use plan and zoning regulations. Continued increases in visitor use of the park would likely result in more frequent congestion and associated increases in the demands

placed on local infrastructure and public services (e.g., roads, water and sewer, police and fire protection, and emergency medical services) in the gateway communities, especially Springdale. However, when comparing these impacts to those of the no-action alternative, the amount of change due to this alternative would tend to be negligible, even though the pace of development may be somewhat faster as a result of the actions of alternative A.

Cumulative Effects. Zion National Park has been a protected area since 1909. As a result of increased visitation to the park, business and residential development have increased. This growth trend has had a positive impact on the local/regional economy, which is likely to continue in the future and not change based on the actions of this alternative. The implementation of the Zion Canyon shuttle system would result in additional NPS expenditures, which also would have a positive, long-term benefit on the local and regional economy. Overall, the planning team expects alternative A to have a long-term, negligible to minor, positive cumulative effect on the local and regional economy.

Conclusion. The park would continue to contribute to the local economy in the short and long run. Some individuals and firms within the region may receive moderate to major, positive, short-term economic benefits as a result of alternative A; however, in terms of the overall economy, these positive effects would be negligible to minor in scope. It is likely that development within the gateway communities would proceed at a faster pace under alternative A, although the development would have an overall negligible effect. In general, alternative A would likely result in a negligible to minor, positive change in the local/regional economy.

UNAVOIDABLE ADVERSE EFFECTS OF ALTERNATIVE A

Alternative A would have similar unavoidable impacts on the park's microbiotic soil crusts as the impacts of the proposed action. Major, localized adverse impacts on microbiotic soil crusts would continue to occur in areas with extensive development and use. Unavoidable losses of microbiotic crusts also would tend to occur in areas with new developments, primarily along the east entrance and Zion-Mt. Carmel Highway, Kolob-Terrace Road, Lava Point, Kolob Canyons Road, and the lower Zion Canyon.

With regard to visitor experiences, alternative A would have about the same potential for unavoidable adverse effects as the proposed action. The imposition of use restrictions in the proposed wilderness area would have an unavoidable adverse impact on those visitors who were not able to hike or camp in the area of their choice. Some individuals would consider any limitations on visitor choice to be an unavoidable adverse effect.

RELATIONSHIP OF SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The restoration of natural processes along portions of the North Fork of the Virgin River would enhance long-term productivity of the biological resources associated with the river and its floodplain.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES FOR ALTERNATIVE A

Because it takes so long to form soil, the loss of soil due to construction of new focused visitor facilities, picnic areas, and trails would be an irreversible commitment of resources. The planning team is not aware of any other irreversible or irretrievable commitments of resources that would occur under alternative A.

IMPACTS OF ALTERNATIVE B: RESOURCE PROTECTION EMPHASIS

NATURAL RESOURCES

Air Quality

Analysis. Several actions in alternative B would affect the park's air quality. Reducing the number and frequency of the Zion Canyon shuttles would result in a minor reduction of short-term vehicle emissions and a minor improvement in near-range visibility. The use of the mandatory shuttle system on the Zion Mt. Carmel Highway would result in a moderate reduction of short-term vehicle emissions and a moderate improvement in near-range visibility. In the future, park managers may need to restrict the number of vehicles along the Kolob Canyons and Kolob-Terrace Roads to fulfill zone prescriptions. This action would reduce vehicle emissions and improve visibility to a minor degree, as compared to existing conditions.

During construction or removal of facilities, particulates and machinery fumes would lead to short-term, localized, minor impacts on air quality. Park personnel would control dust by applying water or other palliatives, and machinery would have to meet emission standards.

Cumulative Effects. The planning team does not know of other actions that would have a cumulative negative impact on the park's air quality. The implementation of the Zion Canyon transportation system and actions taken to minimize pollution sources in the park (e.g., encourage campers to use gas stoves for cooking), would moderately reduce local emissions and improve near-range visibility.

Conclusion. With a reduction in visitor use levels, the institution of a mandatory shuttle system on the east side, and a reduction in the Zion Canyon shuttle system, alternative B

could result in minor to moderate reductions in vehicle emissions and minor to moderate improvements in near-range visibility. Construction activities would result in minor, short-term decreases in local air quality.

Water Quality

Analysis. Under alternative B, there would be decreased use along many streams within the park, including the Zion Narrows above Mystery Canyon, increased visitor management efforts, and possible revegetation of portions of the North Fork. These actions would benefit water quality, but as in the other alternatives, turbidity would still occur along reaches where visitors directly disturbed stream bottoms and in localized areas where they eroded stream bank soils. Water pollution would also continue to occur from trash or human wastes deposited in or near streams. Overall, there would be a minor, long-term improvement in water quality.

Like in the other action alternatives, under alternative B, the construction of new visitor facilities and the implementation of river restoration measures would result in some water quality impacts. The construction activities could result in minor increases in suspended sediment, turbidity, and petroleum residues in nearby streams. These impacts would be temporary and mitigated using the measures listed in the other alternatives. River restoration measures along the North Fork of the Virgin River that involved the physical manipulation of the river banks or bed would result in moderate, short-term increases in turbidity. Sediment discharges would continue to increase intermittently for a few years as the river adjusted to a new channel, although the vast majority of this discharge would occur during flood events when the river was naturally very turbid.

Cumulative Effects. As in the other alternatives, cumulative impacts would be negligible from water pollution sources provided there was cooperation between the park staff, adjacent landowners, and the Utah Department of Natural Resources, and park staff participate in the Virgin River watershed management planning process.

Conclusion. Decreased visitor use would result in minor, long-term improvements in water quality. Moderate, short-term increases in turbidity would occur due to river restoration measures, and minor, short-term increases in turbidity would result from other construction activities.

The North Fork of the Virgin River Floodplain

Analysis. Under alternative B, the Zion Lodge and associated buildings would be retained, although their function would change. The lodge would be outside of the 100- and 500-year floodplains, but would remain within the probable maximum floodplain due to a lack of other suitable sites on the narrow canyon bottom. Facilities at Birch Creek would remain within the probable maximum floodplain. Decreased day use in the canyon above Mystery Canyon, which is a primitive zone, would reduce the number of people at risk to flooding. As in the other alternatives, the park evacuation plan and warning system and public education efforts would help reduce the risk of this potentially hazardous condition.

Under alternative B, the river restoration measures would have the same major, long-term, beneficial effects on the river as under the proposed action and alternative A.

Cumulative Effects. Cumulative impacts would be similar to those of the proposed action and alternative A. Because of past modifications to the river, measures to restore floodplain processes and associated natural

values would lead to moderate, long-term, beneficial cumulative effects on the North Fork.

Conclusion. Under alternative B, there would be a minor, long-term decrease in the number of people exposed to flood hazards. Alternative B also would have a moderate to major, long-term, beneficial effect on natural river processes and other natural floodplain values within the park and along the North Fork.

Riparian/Wetland Communities

Analysis. The restoration of floodplains and associated riparian communities along portions of the North Fork would have a moderate, long-term, beneficial effect on riparian communities, similar to the effects of the proposed action.

Although total spring flows are not measured, diversion structures in Zion Canyon presently divert up to 50% of some spring flows. The removal of six spring diversion structures in Zion Canyon would result in greater water flows downstream of the springs. Surface flows would extend farther downstream and would likely support an enlarged riparian zone, which currently extends from about 200 feet (Temple of Sinawava) to 1,000 feet (Grotto Spring and Birch Creek Spring) along the drainage below the springs. A downstream extension of surface flows in these streams would be likely along with some minor expansion of riparian vegetation. This positive impact would be most noticeable in Birch Creek, which runs the greatest length before joining the North Fork. The removal of the diversion structures would create a minor, long-term, beneficial effect that would incrementally increase the amount of riparian habitat in the park.

With increased visitor management efforts (developed as part of the river management plan) and possible revegetation of portions of the North Fork, impacts on vegetation would

be further minimized. Thus, alternative B would have a minor to moderate beneficial effect, with the greatest benefits occurring in sections with present channelization and heavy use.

Riparian communities elsewhere in the park would remain relatively intact. With a high proportion of the park being pristine and research natural area zones, this alternative would result in decreased use and fewer impacts in many of the backcountry trails and routes in canyon bottoms. In particular, the significant reduction in use within the fairly extensive riparian corridor along the Left Fork would have a moderate beneficial effect. Most impacts on riparian communities due to trampling would be negligible.

Cumulative Effects. Cumulative impacts of alternative B would be similar to those of the proposed action. The protection and improvement of riparian habitat in the park would have a moderate, positive cumulative impact on riparian areas within the Virgin River watershed.

Conclusion. Under alternative B, overall impacts on riparian communities within the park from recreational use would be negligible. The restoration of the flows of six springs would result in a minor, long-term increase in the riparian zone along the small streams supported by these springs. The restoration of riparian habitat along the North Fork and the reduction of visitor use impacts along the Left Fork would result in a moderate, long-term, beneficial, localized impact. From a watershed perspective, these actions would have a moderate beneficial effect.

Hanging Gardens

Analysis. The hanging gardens located in three locations within Zion Canyon would be in research natural area zones. This designation would afford additional protection to the

gardens in that very few people would have access to them. With continued application of mitigation measures, damage or loss of vegetation would be limited, resulting in minor adverse impacts.

Cumulative Effects. Past human impacts on several hanging gardens have been substantial, but they have been mitigated by building trails and barriers that prevent contact with the gardens. Consequently, although several hanging gardens have been readily accessible, loss of vegetation has been minor. Continued mitigation, coupled with reduced use levels, would result in a moderate, long-term, beneficial cumulative impact to hanging gardens.

Conclusion. Alternative B would have the same impact on hanging gardens as that of the proposed action.

Microbiotic Crusts

Analysis. As in all of the alternatives, moderate to major, localized disturbance to soils in developed and high use areas would continue to occur — primarily along the east entrance and Zion-Mt. Carmel Highway, Kolob-Terrace Road, and Kolob Canyons Road. For example, soil disturbances and loss of microbiotic crusts would continue from people walking off of trails in frontcountry high development, frontcountry low development, and transition zones. The construction of some new developments, such as the east side visitor center, also could result in the long-term loss of soils or disturbance from erosion and soil compaction. To minimize these impacts, new developments would be located in previously disturbed areas or away from microbiotic crusts where possible.

Unlike the other alternatives, in alternative B, there would be a decrease in visitor use and the removal of many visitor facilities, including trails, trailheads and parking spaces, due to zoning requirements. The decrease in visitor use and the reduction of roadside

parking along the Zion-Mt. Carmel Highway would lead to minor to moderate localized reductions in soil compaction and erosion.

Zones that allow for little development (primitive) or no development (pristine and research natural areas) would cover most of the park. Therefore, trails and campsites could be located in areas with little or no impact to microbiotic crusts. Impacts on microbiotic crusts would still occur due to people who hiked off-trails. However, visitor numbers would be very low, thus reducing the potential number of off-trail hikers or hikers in areas without trails. Soil impacts in these zones would be minor.

Cumulative Effects. In general, many of the soils in the park have recovered from the effects of past grazing, farming, and logging. Permanent loss of microbiotic crusts has occurred in developed areas, such as roads, trails, and buildings, although most of the park lands that likely support microbiotic crusts would not be subject to new disturbance. Because of the limited and localized extent of new impacts, this alternative would have a minor cumulative impact.

Conclusion. Most of the park lands likely supporting microbiotic soils would not be subject to disturbance. In a few areas with extensive development and use, localized, long-term, adverse, moderate to major impacts on microbiotic crusts would continue, however. The reduction in visitors would cause a minor to moderate, localized reduction in soil compaction and erosion, primarily along the Zion-Mt. Carmel Highway and in much of the lower Zion Canyon. From a parkwide perspective, with reduced use levels and fewer developments, alternative B would have a minor, long-term, positive impact on microbiotic crusts.

Virgin Spinedace

Analysis. As under the proposed action, under alternative B, river restoration efforts and increased visitor management would result in a long-term improvement to spinedace habitat along portions of the North Fork and potentially to the entire population. River restoration efforts could result in short-term increases in turbidity, but these impacts would be negligible, if the restoration work does not occur during spawning periods. There would be a minor to moderate, long-term benefit to the fish population along the North Fork.

Negligible to minor impacts would be expected to populations of spinedace elsewhere in the park. Low to very low use levels would occur in the East Fork in Parunuweap Canyon and Shunes Creek research natural area zones and the North Creek pristine zone. Depending on the structures used to divert water from Shunes Creek under an existing private water right, spinedace populations there could be negatively impacted temporarily. The impacts of this action are being evaluated in a separate environmental assessment.

Cumulative Effects. Cumulative impacts would be similar to those of the proposed action. Minimizing the impacts on spinedace through greater management of recreational use (based on the implementation of a river management plan), river restoration efforts, and the inclusion of the river in a primitive zone would provide increased protection to the North Fork population. This protection would be a major, long-term, beneficial effect.

Conclusion. Increasing visitor management and restoring the river would protect and potentially enhance the spinedace population, creating a minor to moderate, long-term benefit to the North Fork population of this species. Impacts on spinedace populations elsewhere in the park would be negligible to minor due to very low and/or restricted

recreational use levels. Overall, there would be a major, long-term, cumulative benefit to spinedace based on further protection and potential enhancement of the park's population.

Mexican Spotted Owls

Analysis. Under this alternative, no facilities would be built in any known owl territory in the park, with the exception of picnic sites along the Zion-Mt. Carmel Highway. Specific locations for the new picnic sites have not been determined, but they would be located in previously disturbed sites along the road. Some of these existing pullouts are within two owl territories. Consultation with the U.S. Fish and Wildlife Service, careful siting of the picnic areas in locations that would not encourage visitors to go into canyons used by owls, and the construction of the facilities outside of the breeding/nesting season, should avoid impacts on the owls. Zoning all the canyons north of the highway that are used by owls as pristine areas would also help to ensure that only very low use levels occurred in these areas.

As in the other alternatives, very popular trails pass through three owl territories associated with side canyons off of the main Zion Canyon, below the Temple of Sinawava. If the results of recreational impact monitoring warranted it, park managers would close portions of these trails where owls were typically found or add signs to keep people on the trail and out of side canyons frequented by owls. These actions would mitigate potential effects from increased visitation in these areas.

All of the other known owl territories are in primitive, pristine, and research natural areas. With this zoning, very low levels of use would occur in the owl territories. Hiking would typically occur during the day and take people in and out of an owl's presence relatively quickly. The zone conditions regarding group

sizes and encounter levels would further limit impacts on owls. Additionally, park managers would not locate any new designated camping sites in owl territories. Dispersed camping would continue in the pristine zones, but assuming a variety of locations were used, there would be a low probability of repeated camping in locations near a nest or roost site. If future surveys indicated that visitors were camping near identified nest or roost sites, camping would be restricted in these locations.

Very low levels of use may affect the behavior of some spotted owls. Park personnel would continue to monitor owl nesting activity and productivity to assess potential impacts and would restrict visitor use if necessary to mitigate these impacts.

Cumulative Effects. The Zion Canyon shuttle system would be the only action that potentially could result in a cumulative impact. The Zion Canyon transportation system planning process evaluated the implementation of a canyon shuttle system and the construction of shuttle stops, with the associated increased use of trails through side canyons supporting owl territories. That process identified trail closures, noted above, as a way to mitigate effects of increased use. No cumulative effects are expected.

Conclusion. Alternative B is not likely to adversely affect the productivity of known spotted owl territories. Of all the alternatives of this plan, alternative B would have the least potential for affecting owls, due to the predominant occurrence of owl territories within research natural areas and pristine zones, which are most prevalent in alternative B.

Desert Bighorn Sheep

Analysis. Zoning Parunuweap Canyon and Shunes Canyon as research natural areas would preclude recreational use and thus provide continued protection to sheep range

and lambing areas. Negligible to minor impacts from sheep research activities could occur. Similarly, zoning canyons and slopes south of the Zion-Mt. Carmel Highway as research natural areas and pristine areas, including important foraging areas in Gifford Canyon and Crawford Wash, would provide further protection to sheep range. These actions would reduce visitor use from already relatively low levels, which would be a minor, long-term, beneficial effect. The addition of picnic sites and short nature trails at existing pullouts/trailheads would negligibly affect sheep use or sheep road crossings.

Cumulative Effects. There would be no cumulative impacts on this species. The sheep may potentially be affected if air tours occur over sheep range in the park. An air tour management plan would be prepared to address this use and the potential impacts on sensitive wildlife such as sheep.

Conclusion. Prohibiting recreational use would prevent impacts on lambing areas, although negligible to minor impacts from sheep research activities could occur. Prohibiting or slightly reducing visitor use in most of the sheep's range, primarily Parunuweap and Shunes Canyons and other areas south of the Zion-Mt. Carmel Highway, would create a minor benefit to sheep, compared to existing conditions.

VISITOR EXPERIENCES AND USES

Natural Sounds

Analysis. This alternative reduces the number of park facilities and visitor use levels, which would result in minor to moderate reductions in noise impacts throughout the park. With fewer people visiting the upper Zion Canyon, due to the termination of the shuttle system at the Zion Lodge, there would be a minor reduction in noise impacts. The mandatory shuttle system operating on the Zion-Mt.

Carmel Highway would reduce traffic, which would result in a moderate reduction of noise impacts. Restricting the number of vehicles along the Kolob Canyons Road and Kolob-Terrace Road may be required in the future to fulfill zone prescriptions. This action would reduce noise impacts to a minor degree compared to the no-action alternative.

Cumulative Effects. The implementation of the Zion Canyon transportation system in combination with the reduction of some other noise sources in the canyon, would result in an overall moderate, long-term, positive effect. If aircraft flights over the park increase, however, the positive effects of the above actions would be substantially diminished.

Conclusions. With a substantial decrease in visitor use in alternative B, there would be a moderate reduction in noise in the park. The most positive effects would be attributed to the reduction of vehicles along the Zion-Mt. Carmel Highway and the reduction in visitor numbers from the lodge to the Temple of Sinawava.

Range of Visitor Experiences and Activities

Analysis. Like in all of the action alternatives, the new management zones in alternative B would help maintain a range of visitor experiences, from solitude and natural quiet to more social and developed experiences. However, alternative B would provide fewer opportunities for visitors to see parts of the park than the other alternatives.

Like in the proposed action, under alternative B, most of the park would be in pristine zones. Visitors would have opportunities for high quality wilderness experiences, and most visitors who were permitted to go into these areas would have a positive experience.

However, some visitors would not be able to hike on a number of trails and routes in the primitive and pristine zones at their preferred

times, or they may have to alter the size of their group due to use limits. These use limits would affect some popular trails and routes, including the Narrows above Mystery Canyon, Orderville Canyon, the La Verkin Creek trail, Hop Valley, upper Emerald Pool, and part of the Observation Point trail. Although most visitors would likely be able to find substitute destinations and enjoy a positive park experience, the use limits would tend to inconvenience and frustrate a moderate number of visitors. For a small group of visitors, any restrictions that affect their personal choice and access would be seen as detracting from their park visit.

Several actions under alternative B would reduce visitor use and significantly alter the recreational opportunities provided in the upper part of the main Zion Canyon. Specifically, closing Zion Lodge to general public use, removing all food service in the canyon, eliminating the horseback riding operation on the Sand Bench trail, and reducing the number and frequency of shuttles going to the Temple of Sinawava would have a major, negative effect on use of the park (see below).

With 94% of the park being in pristine and research natural area zones under alternative B, park managers would prohibit some horseback riding in areas where this activity is currently permitted. In particular, they would eliminate popular horseback riding areas along the Hop Valley trail, Scoggins Wash, and upper Coalpits Wash. Some horseback riders would find other areas in the park to ride horses, such as the Coalpits Wash-Chinle loop, while other horseback riders would likely be displaced to areas outside the park.

As noted in the alternative, a commercial services plan would be prepared to determine if guided activities should be permitted in Zion. However, under alternative B, areas that could be opened to commercial guiding would be very limited. Thus, the alternative would foreclose some potential new experiences. If

guided activities were to be permitted in Zion, the impacts of these activities would be assessed as part of the commercial services and wilderness management plans.

Acquiring access easements would have the same effects as those described under the proposed action. These easements would ensure that visitors could continue to access several popular trails and routes that currently go through private land. Thus, this action would have a major, positive impact on visitors using those routes.

Kolob Canyons Road — Under alternative B, park managers may add a few new visitor developments at the entrance area and provide additional interpretive facilities along the road, which would have a minor, positive effect on the visitor experience. However, removing the parking area at the South Fork of Taylor Creek would have a moderate, negative impact on visitors, because it would eliminate the opportunity for people to stop and view this area and would displace visitors who hiked here.

Although use levels in much of the Kolob Canyons area would decrease under this alternative, it is likely that use would still increase along this road due to the restrictions in the rest of the park and that this road would be one of the few upon which visitors could still drive in their own vehicles. If visitation to the Kolob Canyons area increased or if visitors stayed longer in this area, crowding and noise levels associated with visitation could increase (e.g., voices, car noises). The degradation of park resources also may occur, such as increased litter and erosion, and the formation of more social trails. These changes would have a minor to moderate, negative impact on those visitors who valued natural quiet, solitude, and viewing park resources in a natural state.

If visitation increased substantially, park managers may place limits on the number of vehicles allowed on the road or institute a

shuttle system. This could inconvenience visitors, limiting when visitors could access the road in their vehicles. However, visitors would be assured of a more rural experience and crowding and noise would be moderated.

Kolob-Terrace Road and Lava Point — Under this alternative, several trailheads and parking areas would be removed (e.g., Hop Valley, the Right Fork, Wildcat Canyon, Connector trail) along the Kolob-Terrace Road. This action would have a minor to moderate, negative impact on some visitors' experiences because it would reduce their hiking opportunities and reduce opportunities to have contact with park resources.

Visitors would no longer be able to drive past the Lava Point entrance area, near the ranger residence. As a result, visitors would have to walk about a mile to reach the West Rim trail. This would have a minor, negative impact on visitors who enjoyed accessing Zion's resources in their vehicles, slightly reducing their opportunities to enjoy Zion's resources. For other visitors, adding one mile onto the length of the trail could add to their enjoyment. However, it is likely that this action would have a negligible impact on the experiences of trail users.

Due to restrictions in other parts of the park, the Kolob-Terrace Road would be one of two major roads visitors could still use to drive into the park. Consequently, visitation could increase here over time.

If visitation to the Kolob-Terrace Road and Lava Point area increased or if visitors stayed longer, noise levels associated with visitation could increase (e.g., voices, car noises) and there would be fewer opportunities for visitors to experience solitude. Some degradation of park resources also may occur. This would have a minor, negative impact for those visitors who valued natural quiet and solitude and viewing park resources in a natural state. If park managers limited traffic or provided

shuttles to Lava Point, these impacts would be reduced or eliminated. Some visitors would be adversely affected if they could not experience the Lava Point area, however.

South entrance and the main Zion Canyon — As noted above, several of the actions under alternative B would have a major, negative effect on recreational use in the main Zion Canyon. Reducing the number and frequency of shuttles running past the lodge would reduce the number of visitors who could experience the last few miles of Zion Canyon, the Temple of Sinawava, and the Narrows. Visitors who were able to get on the shuttles would have opportunities to come into contact with and enjoy some of Zion's most spectacular resources. A number of people also would visit to the research/environmental education center and then hike or bike approximately 3 miles to the upper end of the canyon. With less people, noise, and signs of other people, most visitors who went past the former lodge would likely have a positive experience.

The reduction in the number of shuttles going past the former lodge would also have negative impacts. During high use periods, visitors would likely wait in long lines to board the shuttles at the south entrance transportation center, which would detract from their park experience. (A reservation system would reduce the lines but would involve other costs for visitors and park managers.) Visitors with time constraints may forego this experience, just visit the lodge area and nearby trails, or go elsewhere either within or outside of the park. Visitors returning from the upper canyon to the park entrance probably would have to wait again to board shuttles. Additionally, visitors who took a shuttle to the upper canyon and then went hiking, and visitors who hiked from elsewhere in the park and ended their trips at the Temple of Sinawava, could have to wait to take shuttles back, especially at the end of the day.

Compared to the other alternatives, reducing the number and frequency of shuttles also would reduce the number of visitors who hiked the popular trails at the upper end of the canyon, including the East and West Rim trails, Weeping Rock, and the Riverside walk. This could have a negative or positive effect on the experience of many visitors, depending on how often the shuttles ran.

Under alternative B, visitors would no longer have the opportunity to take concession-operated horseback rides on the Sand Bench trail. This would be a major, adverse impact on visitors who wanted to horseback ride in the canyon. However, it would be a positive impact on visitors who wished to hike the Sand Bench trail without the presence of horses.

Visitors would no longer have the opportunity to stay overnight at the Zion Canyon Lodge. These visitors would need to find lodging outside the park, which would be inconvenient and might reduce the time they spent in the park and the contact they had with park resources. For visitors who valued being able to stay overnight in Zion Canyon but did not wish to camp, this action would have a major, adverse impact on their experience.

Visitors would still experience the former Zion Canyon Lodge as a center of activity because it would function as an environmental education center and the terminus for many shuttles. This would be a moderate to major, positive impact on people who sought environmental education opportunities. Depending on how park managers operated the center and the shuttle bus stop, noise, crowding, and congestion could increase or decrease in the vicinity of the former lodge.

Because food service would no longer be available in the park, visitors may curtail their stay to dine outside of the park, thus reducing their contact with park resources. Other visitors would simply be inconvenienced. This

action would have a moderate, adverse impact on those visitors who wanted to or were expecting to dine in the canyon.

Some visitors and school groups would have increased opportunities to learn about park resources and interact with researchers at the environmental education center. This would allow them to better understand Zion's significance, increase their enjoyment of the park, and increase the protection of park resources. The center would have a positive impact on the experiences of Zion visitors, but the degree of these impacts would depend on how the education center was managed. Criteria such as who could use the center, how long the groups could visit, how many people could participate would all affect visitors' experiences. The extent of these impacts cannot be evaluated at this time.

East entrance and the Zion-Mt. Carmel Highway — Like in the proposed action, the development of a visitor center near the east entrance would improve orientation and facilitate trip planning for visitors who arrived at Zion National Park from the east. The facilities would provide conveniences for visitors, such as restrooms, a place to obtain backcountry permits, and information about the Zion Canyon shuttle system. Visitors would have additional opportunities to learn about the park's significant resources and primary interpretive themes of Zion before they drove through the park to the south entrance and transportation center. Better education about resources would lead to increased visitor understanding and enjoyment and better protection of park resources. This action would have a moderate, positive impact on the experiences of visitors who arrived through the east entrance.

Because the area around the east entrance and the Zion-Mt. Carmel Highway itself would be a frontcountry high development zone, visitors potentially would have greater opportunities for and improved access to interpretation,

picnicking, hiking, and information about park resources in this area of the park. Increased contact with park resources and additional interpretive opportunities could increase visitor understanding, appreciation, and enjoyment of those resources.

Under alternative B, visitors would be required to take a shuttle along the Zion-Mt. Carmel Highway. This requirement would severely inconvenience park visitors and tourists who used the Zion-Mount Carmel Highway as a way to get across southwestern Utah. Some people would be deterred from visiting the east side of the park, while others (particularly travelers from points east) might be completely deterred from entering Zion. This would have a major, negative impact on visitors' enjoyment and understanding of Zion's significance.

Visitors who took the shuttle would have a more structured experience with less opportunity for unprogrammed stops to view wildlife, take photographs, or go exploring. This would have a moderate, adverse impact on visitors who valued personal choice and unrestricted access.

Noise levels associated with shuttle buses, parking lots, and people would increase around the east entrance facility and staging area. This would have a moderate, but localized, adverse impact on the experiences of visitors who valued natural quiet.

As noted in the alternative, local residents who traveled through the park for commuting purposes would be considered through traffic and allowed to use the highway. Thus, this alternative should not affect these drivers.

The shuttle system would have some positive effects, as well. Visitors who used the shuttles would experience the road with less traffic and under safer conditions. They would be able to enjoy the scenery without worrying about driving. Because traffic on the Zion-Mt.

Carmel Highway would be reduced, visitors hiking in the vicinity would have increased opportunities to enjoy natural quiet. In addition, the shuttles would provide a convenient service for visitors who wanted to do one-way hikes to or from the eastern part of the park, or for groups of visitors who wanted to split up. This would have a minor, positive impact on the experiences of visitors who valued quiet and reduced traffic congestion.

Other frontcountry areas — Like in the proposed action, trailheads and parking spaces for the East Rim and East Mesa trails would be improved under alternative B, which would provide visitors with better opportunities to experience different areas of the park. Increased contact with park resources would increase visitor understanding, appreciation, and enjoyment of those resources, which would have a moderate, positive effect on visitors in this part of the park.

Proposed wilderness — Alternative B would have positive benefits for those visitors who were able to go into the proposed wilderness area. Once visitors entered the proposed wilderness area they would most likely have a quality experience appropriate for a wilderness area (e.g., the experience of natural quiet and solitude). Thus, this alternative would result in a positive experience for those visitors who desired a wilderness experience at Zion and were willing to be flexible in their plans.

However, alternative B would also have several negative impacts on visitors. Compared to existing conditions and the other two alternatives, alternative B would provide substantially fewer opportunities for hiking on trails and camping at designated campsites (i.e., primitive zone experiences). Compared to existing conditions, alternative B would require the reduction of present or future use levels on 25 trails and routes, including several popular trails. Most visitors would no longer have the opportunity to access certain

popular features, trails, and routes, including Observation Point, La Verkin Creek, Hop Valley, Taylor Creek, and upper Emerald Pool, due to these visitation limits. Use of the proposed wilderness area probably would decline by a moderate to major amount, depending on the area and the redistribution of use among trails. Overall, it is likely that the use limits would have a moderate to major, adverse impact on visitors who could not enter the proposed wilderness area and for those visitors who valued the option of choosing where they wanted to go and when. These use limits could also discourage some potential visitors from visiting Zion.

In addition, there probably would be inconveniences for visitors prior to entering the wilderness, such as obtaining permits, making reservations, or potentially changing the dates or destinations of their trip. Use limits and maximum group sizes would also likely mean that potential visitors might have to change their destinations, the season of their trip, or the number of people in their party. This could be a minor inconvenience, or a major one, if a potential visitor planned on visiting Zion for only a short period and had expected to access a specific area at a specific time.

Under this alternative, the public would continue to be prohibited from entering Parunuweap Canyon and would not be able to experience its unique resources. This would have a moderate, adverse impact on the experiences of visitors who wished to see Parunuweap.

Research natural areas — Under alternative B, approximately 20,470 acres of Zion's proposed wilderness would be research natural area zones and therefore opened only to guided educational trips and research. Many of these areas currently receive little recreational use. Therefore, managing these areas as research natural areas and restricting public use would have a negligible impact on the experiences of most visitors. However, a few

visitors would be displaced from areas such as lower La Verkin Creek, the Right Fork of North Creek, and Dalton Wash. Some of these visitors would be able to find substitute destinations, but others may not be able to do so. Thus, this alternative would likely have a moderate to major, negative impact on a few visitors who wished to visit these areas.

Scenic views — As in the proposed action, under alternative B, park managers could develop several new facilities that could affect scenic views (e.g., new facilities at the east entrance). Even with appropriate facility design and landscaping to minimize impacts, these developments would have a minor, negative impact on the experiences of visitors who valued a less developed visual scene.

On the other hand, this alternative would require the removal of several facilities, including parking areas along the Kolob Canyons and the Kolob-Terrace Roads, and administrative facilities in Zion Canyon. These actions would allow visitors to experience Zion's scenic resources without the intrusion of these modern facilities, providing a minor, positive impact on the experiences of visitors who valued a visual scene that was less developed in character.

Cumulative Effects. The many management actions proposed under alternative B (e.g., closing trails, eliminating opportunities for horseback riding and staying overnight at the Zion Lodge, reducing in the number and frequency of shuttles going to the Temple of Sinawava, and operating the mandatory Zion-Mt. Carmel Highway shuttles), taken in conjunction with the Zion Canyon shuttles, would limit access to many park resources and create a much more structured visitor experience than the opportunities presently available. In most areas of the park, visitors would have substantially fewer personal choices regarding where they wanted to visit and when. Thus, alternative B has the potential for

a moderate to major, negative cumulative impact on many visitors' experiences at Zion.

Conclusion. For visitors who valued opportunities to experience solitude, quiet, and pristine landscapes, alternative B would have a moderate to major, positive impact. The new education/research center would positively affect the experiences of some visitors and school groups. The mandatory shuttle on the Zion-Mt. Carmel Highway would also have a positive impact for some visitors, reducing traffic and providing an opportunity to hike one-way on trails.

But for many visitors, alternative B would have a moderate to major, negative impact on their experience in much of the park. Compared to all of the other alternatives, fewer visitors would experience Zion Canyon above the Zion Lodge or have the opportunity to stay overnight and ride horses in the park. The reduction in the number and frequency of shuttles going past the Zion Lodge would have a positive effect on visitors who traveled beyond the lodge and a negative effect on visitors who had to wait or were displaced. The mandatory shuttle on the Zion-Mount Carmel Highway would further reduce personal choices and access to the park's resources. New use limits would reduce opportunities for those visitors who wanted to see and experience the Zion backcountry and most of the park's resources.

Taken as a whole, all of the above actions would have a moderate to major, negative impact on visitors in the frontcountry and moderate, positive and negative impacts on visitors in the backcountry.

Visitor Experiences in Other Nearby Recreational Areas

Although most potential visitors would still be interested in experiencing Zion, alternative B would have the potential to displace many individuals. A few visitors would not go to

Zion if they could not stay overnight in the park, could not see the upper end of the main Zion Canyon, or had to take shuttles to see much of the park. Individuals who could not access the Zion backcountry due to limits on visitor numbers, or those who wanted to experience a backcountry with a larger group, also might visit other state and federal recreational areas rather than Zion. The impact of these displaced visitors on other state and federal areas would depend on the specific areas affected, the number of visitors actually displaced, and the times when they were displaced. For most areas, it is likely that increased visitation resulting from the actions in alternative B would have a minor, negative impact on the visitor experiences in those other areas.

Cumulative Effects. Although people would likely be displaced to other recreational areas as a result of the actions taken in alternative B, the operation of the Zion Canyon shuttle system would prevent the overall number of people who were displaced from Zion to other state and federal areas from being too large. Even if many of these potential visitors chose not to go to Zion or chose to shorten their Zion trips, many of the displaced visitors would still be visiting these other recreational areas as part of their "Grand Circle" vacations. Thus, alternative B would have a minor cumulative effect on the experiences of visitors in other recreational areas.

Conclusion. The actions taken under alternative B would likely result in the displacement of visitors from Zion to other nearby state and federal recreational areas. However, the number of displaced visitors would not tend to substantially alter the experiences provided at these other areas. Thus, alternative B would likely have a minor, negative effect on the experiences provided at most nearby recreational areas.

THE SOCIOECONOMIC ENVIRONMENT

Analysis. The conversion of the lodge to an educational facility and the removal of the horseback riding operation and food and gift sales would result in a major, long-term, negative impact on concessioner businesses and their employees within the park. However, some businesses outside the park may actually benefit from the reduction of commercial services within the park because of reduced competition.

A general reduction in visitor use levels could negatively affect some area businesses or individuals to a minor to moderate degree. Conversely, a reduction in visitor numbers in the park would result in less crowded conditions that may entice some visitors to stay longer, which in turn may encourage more spending within the local communities. Fewer visitors who stayed longer (and perhaps spent more) and the lack of competition from businesses located within the park may actually benefit the local gateway economies to a minor to moderate degree. These impacts are likely to be long term in duration. In addition, a few individuals and firms would receive short-term, positive, minor to moderate benefits due to increased opportunities to provide goods and services related to removing, converting, and constructing facilities within the park. These projects would occur at different times and would be spread throughout the park, which would serve to distribute the overall benefits.

Past increases in visitor use levels and the concurrent demands for goods and services have led the private sector outside of the park to increase development and economic activity. Long-term reductions in visitor use levels would reduce the current rate and intensity of development within the gateway community of Springdale and environs. This development would likely continue at a slower pace and may eventually level off as the long-

term, sustainable commercial and residential potential of the area was realized. While the built environment of this area would continue to evolve, the small town "pioneer heritage" image would be fostered and protected by the local land use plan and zoning regulations.

The park would continue to provide the basis for the local tourism industry served by the private sector outside of the park. The effect on the local economy in terms of population, employment, income, and the like, could be either positive or negative. In either case, the effect would likely be negligible to minor due to the relatively large size of the local economy compared to the actions of alternative B.

Cumulative Effects. Zion National Park has been a protected area since 1909. As a result of increased visitation to the park, business and residential development have increased. This growth trend has had a positive impact on the local/regional economy. The actions in alternative B would affect use of the park's backcountry areas, but would not likely diminish the growth trend in the park's frontcountry areas. The implementation of the Zion Canyon shuttle system also would result in additional NPS expenditures and have a positive, long-term benefit on the local and regional economy. Overall, alternative B would likely have a long-term, negligible, negative cumulative effect on the local and regional economy.

Conclusion. Reduced visitor use and the removal of commercial activity from within the park would negatively impact some businesses and individuals to a minor to moderate degree within the gateway communities, especially Springdale. However, the elimination of competition from the park could actually benefit some of these same businesses. So the overall effect (positive or negative) is indeterminate, but probably would be minor to moderate for most affected entities.

Concessioner businesses and their employees would be affected by the loss of their contracts and jobs. These impacts could be moderate to major depending upon the individual situations. In addition, some development projects would provide a few individuals and firms with short-term economic benefits that would be moderate to major (for those directly affected) depending upon the level of involvement that occurred. Thus, while some firms and individuals would experience a moderate to major effect, overall, alternative B would result in a negligible to minor, negative change in the local/regional economy.

UNAVOIDABLE ADVERSE EFFECTS OF ALTERNATIVE B

As in the other alternatives, major, localized, adverse impacts on microbiotic soil crusts would continue to occur in areas with extensive development and use. Unavoidable losses of microbiotic crusts also would be likely in areas with new developments, primarily along the east entrance and Zion-Mt. Carmel Highway and the lower Zion Canyon.

With regard to visitor experiences, the elimination of the horseback riding operation in Zion Canyon would be considered by some to be an unavoidable adverse effect. The implementation of a mandatory shuttle on the Zion-Mt. Carmel Highway would have a major, adverse impact on visitor experience by inconveniencing visitors or leading them to decide not visit the park at all. Many would view reducing the number and frequency of the

shuttles going up to the Temple of Sinawava as an unavoidable adverse effect that prevented people from seeing and enjoying the upper part of the main canyon. The termination of lodge operations would have a major, negative impact on visitors who wished to stay overnight in Zion but did not wish to camp. Designating Parunuweap Canyon as a research natural area would also have unavoidable adverse impacts on visitors who wished to experience this unique area.

RELATIONSHIP OF SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Restoring natural processes along portions of the North Fork of the Virgin River would enhance long-term productivity of the biological resources associated with the river and its floodplain.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES FOR ALTERNATIVE B

Like in the other action alternatives, the loss of soil due to construction of new visitor facilities would be an irreversible commitment of resources. The planning team is not aware of any other irreversible or irretrievable commitments of resources that would occur under alternative B.

Concessioner businesses and their employees would be affected by the loss of their contracts and jobs. These impacts could be moderate to major depending upon the individual situations. In addition, some development projects would provide a few individuals and firms with short-term economic benefits that would be moderate to major (for those directly affected) depending upon the level of involvement that occurred. Thus, while some firms and individuals would experience a moderate to major effect, overall, alternative B would result in a negligible to minor, negative change in the local/regional economy.

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CONSULTATION AND COORDINATION



PUBLIC INVOLVEMENT ON THE DRAFT GENERAL MANAGEMENT PLAN / ENVIRONMENTAL IMPACT STATEMENT

Consultation and coordination among the governmental agencies and the public were vitally important throughout the planning process for the *Draft General Management Plan / Environmental Impact Statement*. Interested citizens had several opportunities to share their views and concerns during this process.

The scoping process for this plan was initiated on December 11, 1996, when the *Federal Register* published a "notice of intent" to prepare an environmental impact statement. Subsequent scoping efforts included the distribution of a letter to the public and public agencies soliciting input regarding the issues and concerns the plan should address (see below).

NEWSLETTERS AND WORKBOOKS

The planning team primarily used newsletters and workbooks to involve the public in developing the plan. During the planning process, the team compiled a mailing list consisting of over 1,000 names. The list included members of planning teams from other state and federal governmental agencies (38), state and federal legislators (6), Indian tribal governments (4), local and regional governments (39), businesses and organizations (32), and interested citizens.

During the course of the planning process, the team published and mailed six newsletters and one workbook to the public. The first newsletter was published in October 1996 and was sent to about 850 people and organizations. Newsletter #1 alerted people about the beginning of the planning process and included information on the park's purposes and significance, its mission goal statements, why a new

approach was being taken for this plan, and how the new plan would help the park. In the newsletter, the planning team also asked the public to comment on a vision for the park and on what issues the plan should address.

The planning team received forty-seven responses to the first newsletter. The most frequently expressed vision for Zion's future was for the continued preservation and protection of the park's scenic and natural resources. Another popular vision was for the availability of more recreational opportunities for visitors. The public also identified a variety of issues and concerns on topics such as commercial guided services, congestion, aircraft overflights, development pressures outside the park, and the impacts of increased use.

Based on the responses to the newsletter, the planning team held focus groups to receive public input on aircraft overflights, river recreation, and climbing/canyoneering. Newsletter #2, published in February 1997, announced that focus group meetings would be held in March 1997, and provided an update on the status of the planning effort. This newsletter did not include a response form.

In April 1997, the planning team distributed the third newsletter. Newsletter #3 summarized the public comments received from newsletter #1, as well as the results of the focus group meetings. This newsletter also did not include a response form.

In May 1997, the planning team distributed newsletter #4 to about 900 people and organizations. This newsletter described 7 potential management zones developed by the planning team, identified 6 possible alternative concepts for managing Zion, and discussed 12 major issues and concerns the plan would address. A

response form asked for comments on the management zones and the alternative concepts.

By the end of the comment period for newsletter #4, the planning team received 26 responses. Most people were supportive of the planning effort to date. Several respondents liked the range of management zones. Almost all of the respondents stated that the range of alternative concepts was appropriate. Again, the respondents expressed a variety of concerns, covering such topics as operating the shuttle system, reducing the numbers of visitors in the park, ensuring the freedom of visitors, and prohibiting some uses.

In October 1997, the planning team published a 16-page alternatives workbook, which was distributed to approximately 1,800 individuals and organizations. The workbook summarized comments received on the May newsletter, described the development of the preliminary alternatives, summarized descriptions of the potential management zones, identified actions that would be common to all of the alternatives, and provided descriptions of six preliminary alternatives for managing Zion. The descriptions of the alternatives highlighted key actions and noted the implications of each alternative.

The workbook included a response form, which asked people to identify their preferred alternative, explain why they prefer the alternative, and make suggestions for improving the alternatives. Another question asked respondents to identify rivers with regionally outstanding natural, cultural, or recreational values. A table in the workbook listed actions that could potentially be implemented in Zion. Respondents identified the actions they would like to see implemented by circling the preferred actions on the table.

About 270 respondents replied to the response form. Most of the respondents did not support any specific alternative as described, but rather suggested revising the alternatives to better reflect their views. People generally preferred an alternative because it protected the park's resources and maintained or increased visitor use. Most of the respondents focused on the actions that would be taken under the alternatives, rather than on how the park would be zoned. Few individuals responded to the question regarding rivers with regionally outstanding values. Those who did respond to this question identified 12 drainages with outstanding values.

In June 1998, the planning team issued a brief update newsletter (#5). The newsletter summarized the comments submitted on the alternatives workbook and identified changes the planning team had made to the management zones and alternatives. Newsletter #5 did not include a response form.

Finally, in December 1998, the planning team distributed another brief newsletter update (#6). This newsletter noted the status of the planning effort and reported that the team had dropped one alternative from consideration. Newsletter #6 also included instructions on how to receive a copy of the draft document, to which the planning team received 212 responses.

PUBLIC AND AGENCY MEETINGS

The planning team held several meetings during the course of the planning process. Two meetings were held with the Springdale Planning Commission; one on November 17, 1998, and the other on June 29, 1999. One meeting was held with the Springdale town council on July 1, 1999. Six briefings were held in St. George with the Southwest Utah Planning Authorities Council (SUPAC), to advise the various land management agencies on the status of the planning effort. These briefings took place: April 9, 1996; August 13, 1996; March 10,

1997; September 2, 1997; January 6, 1998; and September 8, 1999. Similar meetings were held with the Five County Association of Governments, one in Cedar City, on October 8, 1997; one in Panguitch, on May 13, 1998; and one in St. George, on November 18, 1998. Meetings were held on June 15, 1999, in Salt Lake City, with the Natural Resource Coordinating Committee, and on September 1999, with the Utah Rural Summit.

As noted above, the planning team held three focus group meetings to discuss the appropriateness and management of aircraft overflights, river recreation, and climbing/canyoneering. The meetings were held in the park on March 25, 26, and 27, 1997. The planning team also accepted written comments. The April 1997 newsletter (#3) includes a summary of the meetings.

In addition to these meetings, members of the planning team consulted with and

sought the views of several agencies and governments during the planning process. On February 26, 1997, in St. George, representatives of the Kaibab Paiute Indian Tribe, Moapa Indian Tribe, and Paiute Indian Tribe of Utah met with park staff to discuss the plan. The tribes were also updated on the planning effort at a May 14, 1997, meeting in St. George.

In November 1996, the planning team initiated informal consultation with the U.S. Fish and Wildlife Service to determine the presence of federally listed threatened and endangered species in Zion National Park. A copy of the Fish and Wildlife Service response to this consultation is included in appendix G. The planning team subsequently contacted the Fish and Wildlife Service in November 1998, to update this list.

Consultation also was initiated with the Utah state historic preservation officer in February 1999, regarding a determination of effect of the plan on cultural resources.

THE BUREAU OF LAND MANAGEMENT'S LAND USE PLAN AMENDMENT COORDINATION AND CONSULTATION

In February 1998, staff from the Bureau of Land Management's (BLM) Dixie Field Office and Zion National Park entered into a memorandum of understanding concerning wild and scenic studies of five specific tracts of public land on the north border of the park and the inclusion of these tracts into the national wild and scenic river system. On April 2, 1998, this memorandum of understanding was amended to include public land encompassing Shunes Creek, a tributary to the East Fork of the Virgin River, contiguous to the southeast border of the park.

On February 17, 1998, a *Federal Register* notice announced the new planning amendment for the Dixie Field Office and solicited public scoping on the proposed action. In addition, in February, a BLM news release was sent to newspapers, radio stations, and television stations throughout Utah, Arizona, and Nevada. The St. George Field Office also sent out a "*Dixie Dispatch*" in

February and September 1998, to the hundreds of agencies, companies, and individuals on the office's planning mailing list. This dispatch was intended to keep the public informed of the planning amendment. The *Proposed Dixie Resource Plan / Final Environmental Impact Statement*, which was released to the public in September 1998, also included a discussion of the planning amendment.

Two meetings took place with the Wild and Scenic River Coordination Group, on March 6 and April 2, 1998, to discuss, among other things, coordination of this planning effort. The coordination group consisted of members of the Utah state government, U.S. Forest Service, National Park Service, Bureau of Land Management, and affected local agencies. The group was formed under a memorandum of understanding to establish a cooperative relationship among the agencies for conducting wild and scenic river studies of Utah rivers.

LIST OF AGENCIES AND ORGANIZATIONS TO WHOM THIS DRAFT DOCUMENT HAS BEEN SENT

There are approximately 212 entries currently on the mailing list for this plan. All persons on the list will be given an opportunity to review the draft document. The National Park Service is circulating the *Draft General Management Plan / Environmental Impact Statement* to the agencies and organizations listed below. A complete list of individuals who received copies of the draft document is on file at the park headquarters.

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
 Dixie National Forest
 Kaibab National Forest
 Natural Resource Conservation Service
Department of the Interior
 Bureau of Land Management
 Arizona Strip
 Cedar City Field Office
 St. George Field Office
 Grand Staircase-Escalante National Monument
 Kanab Field Office
 Bureau of Indian Affairs
 Bureau of Reclamation
 National Park Service
 Arches National Park
 Bryce Canyon National Park
 Canyonlands National Park
 Capitol Reef National Park
 Cedar Breaks National Monument
 Dinosaur National Monument
 Glen Canyon National Recreation Area
 Grand Canyon National Park
 Mesa Verde National Park
 Pipe Spring National Monument
 Utah State Coordinator
U.S. Fish and Wildlife Service
U.S. Geological Survey

Department of Transportation
 Federal Aviation Administration
 Federal Highway Administration
Federal Emergency Management Agency
U.S. Environmental Protection Agency
 Region VIII

Utah Congressional Delegation

Representative Cannon
Representative James V. Hansen
Senator Robert F. Bennett
Senator Orrin G. Hatch

Utah State Agencies

Department of Agriculture
Department of Environmental Quality
Department of Natural Resources
 Division of Wildlife Resources
 Division of Water Resources
 Division of Water Rights
Department of Tourism
Department of Transportation
School Trust Lands Administration
Office of the Governor
 Governor Mike Leavitt
 Office of Planning and Budget
 State Clearinghouse
Utah Division of State History
Utah State University
 College of Natural Resources
 Department of Forest Resources

Utah Legislative Delegation

Rep. Demar "Bud" Bowman
Rep. Bill Hickman

Other State Agencies

Arizona Office of Tourism
Nevada Office of Tourism

Indian Tribal Governments

Hopi Tribe
Kaibab Paiute Tribe
Moapa Band Paiute Tribe
Paiute Indian Tribe of Utah

Regional, County, Local, and City/Township Governments

City manager, Cedar City, UT
City manager, Mesquite, NV
City of Page, AZ
Five County Association of Governments
Iron County Commissioners
Kane County Commissioners
Kane County Office of Tourism
Kane County Water Conservancy District
Mayor of Alton, UT
Mayor of Brianhead, UT
Mayor of Cedar City, UT
Mayor of Colorado City, AZ
Mayor of Enoch, UT
Mayor of Enterprise, UT
Mayor of Flagstaff, AZ
Mayor of Fredonia, AZ
Mayor of Hildale, UT
Mayor of Hurricane, UT
Mayor of Ivins, UT
Mayor of Kanab, UT
Mayor of Kanarraville, UT
Mayor of Laverkin, UT
Mayor of Leeds, UT
Mayor of Mesquite, NV
Mayor of New Harmony, UT
Mayor of Orderville, UT
Mayor of Paragonah, UT
Mayor of Panguitch, UT
Mayor of Parowan, UT
Mayor of Rockville, UT
Mayor of St. George, UT
Mayor of Santa Clara, UT

Mayor of Springdale, UT
Mayor of Virgin, UT
Mayor of Washington, UT
Mohave County Board of Supervisors, AZ
Springdale Planning Commission
Washington County Commissioners
Washington County Water Conservancy District

Organizations and Businesses

Aikens Lodge
Amfac Parks and Resorts
Bryce/Zion Trail Rides
Cedar Breaks Lodge
Canyon Kayak
Color Country Travel
Colorland Tours
Defenders of Wildlife
Grand Canyon Trust
Kane County Travel Council
League of Women Voters
National Audubon Society
National Parks and Conservation Association
National Trust on Historic Preservation
National Wildlife Federation
Red Ledge RV Park & Campground
Salt Lake Convention and Visitors Bureau
St. George Chamber of Commerce
Sierra Club
South Utah Wilderness Alliance
U.S. and Canada Study Tours
Utah Native Plant Society
Utah Travel Council
Utah Wilderness Alliance
Washington County Travel and Convention Bureau
Wilderness Society
Wilderness Watch
World Wildlife Fund
Zion Canyon Chamber of Commerce
Zion Canyon Cinemax
Zion Lodge
Zion Natural History Association

Local Libraries

State Library (Salt Lake City)
Kanab
Springdale
Hurricane
St. George
Las Vegas
Panguitch
Salt Lake City Public Library (Government Documents)
University of Utah
Utah State University Library
Harold E. Lee Library, Brigham Young University
Southern Utah University Library

Media

AM Park Network
Associated Press
Daily Spectrum
Dixie Datebook
Environmental News Network
Garfield County News
Grand Canyon Report
Las Vegas Review-Journal
MB Broadcasting
Off the Beaten Path
Salt Lake Tribune
Southern Utah Sportsman Magazine
Southwest Utah Magazine
Thompson Newspapers

APPENDIXES, BIBLIOGRAPHY, PREPARERS, AND INDEX



APPENDIX A: SUMMARY OF LEGISLATIVE HISTORY FOR ZION NATIONAL PARK

1. Mukuntuweap National Monument established on July 31, 1909, by Presidential Proclamation No. 877 (36 Stat. 2498). Total acreage: 15,200 acres.
2. Mukuntuweap National Monument name changed to Zion National Monument on March 18, 1918, by Presidential Proclamation No. 1435 (40 Stat. 1760). The proclamation also added 61,600 acres of land. Total acreage now: 76,800 acres.
3. Zion National Park established from Zion National Monument on November 19, 1918, by Act of Congress (41 Stat. 356). Included all lands formerly in the monument.
4. On June 13, 1930, Congress approved Public Law No. 351 (46 Stat. 582), which added 17,441 acres to the park. Total acreage now: 94,241 acres.
5. Zion National Monument was established on January 22, 1937, by Presidential Proclamation No. 2221 (50 Stat. 527). Gross acreage of the monument was 48,414 acres.
6. Zion National Monument was made a part of Zion National Park on July 11, 1956, by Act of Congress (70 Stat. 527). All lands formerly in the monument were included in the park. Total acreage now: 142,655 acres.
7. An act to revise the boundaries of Zion National Park was approved February 20, 1960 (74 Stat. 4). The boundary change added a total of 3,485 acres to the park. Total acreage now: 146,610 acres. (Note: Official land records of the National Park Service indicate that as of January 1, 1970, gross acreage of Zion National Park was 147,035 acres.)
8. An act to revise the boundaries of the national park was approved October 21, 1976 (90 Stat. 2732).

APPENDIX B: SUMMARY OF KEY LEGAL MANDATES

Legal mandates provide direction for what can and cannot be considered in this plan. Several of the provisions of key legal mandates are summarized below.

NATIONAL PARKS AND RECREATION ACT OF 1978 (P.L. 95-625)

Section 604(b) of this act requires that general management plans be prepared and revised in a timely manner for each unit in the national park system. The act further specifies that general management plans shall include measures for the preservation of the area's resources, indications of the types and intensities of development associated with public use of the unit, visitor carrying capacities for all areas of the unit, and indications of potential modifications of the unit's external boundaries if needed.

ENDANGERED SPECIES ACT OF 1973, AS AMENDED (16 USC 1531 ET SEQ.)

The purpose of this act is to provide protection for animal and plant species that are currently in danger of extinction (endangered) and those that may become so in the foreseeable future (threatened). Section 7 requires all federal agencies to ensure that their activities do not have adverse impacts on the continued existence of threatened or endangered species or on designated areas (critical habitats) that are important in conserving those species. Thus, the National Park Service is required to fully integrate endangered species conservation planning into park system management. Agencies also are required to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. The result of formal or informal consultation with the Fish and Wildlife Service should be documented in an environmental assessment or environmental impact statement.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA; P.L. 91-190)

This act sets forth the federal policy to preserve important historic, cultural, and natural aspects of our national heritage. Another purpose of NEPA is to help public officials make decisions that are based on an objective understanding of environmental consequences and to take actions that protect, restore, and enhance the environment. The act applies to all federal projects or projects that require federal involvement. All federal agencies are directed to use a systematic, interdisciplinary approach that integrates natural and social sciences in planning and decision making that may impact the human environment. NEPA and the Council on Environmental Quality implementing regulations describe the process a proposed federal action such as this plan must follow. Among the steps in the process, NEPA and the regulations require early coordination, called "scoping," to determine the scope and significance of issues to be addressed in an environmental impact statement. A structured format for public involvement during the public review process is specified. When preparing an environmental impact statement, the regulations further require federal agencies to rigorously explore and objectively evaluate all reasonable alternatives to the proposed action.

WILD AND SCENIC RIVERS ACT OF 1968 (P.L. 90-542)

This act establishes federal policy to preserve certain rivers with remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values in a free-flowing condition and to protect their immediate environments. The act created the national wild and scenic rivers system and outlined criteria and procedure whereby free-flowing streams, or portions thereof, could be added to the system. The system includes wild, scenic, and recreational rivers. Rivers and streams proposed for inclusion in the system must be considered during project planning and project impacts identified in an environmental assessment or an environmental impact statement.

NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED (16 USC 470, ET SEQ.)

This act establishes as federal policy that the historical and cultural foundations of the nation's heritage be preserved. Section 106 requires that federal agencies that have direct or indirect jurisdiction over undertakings take into account the effect of those undertakings on properties eligible for or included in the National Register of Historic Places. The section also provides the Advisory Council on Historic Preservation and the state historic preservation officer an opportunity to comment on the undertaking. The 1992 amendments to the act have further defined the roles of American Indian tribes and the affected public in the section 106 consultation process. Section 110 requires federal managers, in consultation with the state historic preservation officers, to establish programs to identify, evaluate, and nominate properties to the National Register of

Preservation and the state historic preservation officer an opportunity to comment on the undertaking. The 1992 amendments to the act have further defined the roles of American Indian tribes

and the affected public in the section 106 consultation process. Section 110 requires federal managers, in consultation with the state historic preservation officers, to establish programs to identify, evaluate, and nominate properties to the National Register of Historic Places. National register eligible or listed properties and national historic landmarks are afforded special protection in federal project federal project planning and implementation.

WILDERNESS ACT OF 1964 (P.L. 88-577)

The Wilderness Act established the national wilderness preservation system, composed of congressionally designated, federally owned areas. Federal agencies are required to administer these areas to provide for their use and enjoyment, now and in the future, and to protect and preserve their wilderness character. NPS policy is to manage all potential, proposed, recommended, and wilderness study areas as wilderness, to the extent that existing nonconforming uses will allow, and to seek to eliminate the temporary conditions that preclude wilderness designation.

APPENDIX C: RELATIONSHIP OF OTHER PLANNING EFFORTS TO THIS GENERAL MANAGEMENT PLAN

Several plans and agreements have influenced or will be influenced by the *General Management Plan*. These documents are briefly described below.

MEMORANDUM OF UNDERSTANDING WITH THE SOUTHERN PAIUTE TRIBE ON COLLECTING NATURAL RESOURCE MATERIALS (1998)

The current memorandum of understanding (MOU) between the Kaibab Band of Paiute Indians, the Moapa Band of Paiute Indians, and the Paiute Indian Tribe of Utah allows for the collection of limited quantities of plant materials by authorized tribal members within the boundaries of Zion National Park and Pipe Spring National Monument. The development of this agreement was a collaborative effort between official tribal representatives and NPS staff. The memorandum of understanding recognizes:

- positive government-to-government relations
- specific or unique needs of tribal communities
- the constitutional religious rights of the tribes involved
- NPS responsibilities under various laws and agency policies to consult with culturally affiliated tribes
- the tribes interest in preserving and protecting their cultural and traditional heritage
- the responsibilities and obligations of the park staffs to protect natural and cultural resources as mandated
- Southern Paiute cultural affiliation and interests in park resources based on ethnographic studies

A collection permit will be authorized by tribal and park officials prior to collection activities. The permit will include the quantity and type of plant material, area of collection, and purpose. A joint monitoring program between tribal members and

park staff will be developed to assess potential impacts to vegetation communities. Both parties to this memorandum of understanding will jointly seek funding to support this resource-protection partnership.

ZION HOUSING MANAGEMENT PLAN (1998)

The housing management plan is intended to provide direction for determining the minimum number of housing units in Zion that are necessary to support the mission of the park. The plan calls for moving all NPS employee housing out of the park except for housing for emergency responders (i.e., employees in positions whose presence is required within a specific geographic area to provide a timely response to emergencies outside normal working hours), seasonal employees, lower-graded employees, and occupants of historic quarters.

ZION CANYON TRANSPORTATION SYSTEM ENVIRONMENTAL ASSESSMENT AND "FINDING OF NO SIGNIFICANT IMPACT" (1997)

This document described and analyzed a proposal by the National Park Service to initiate a bus shuttle system and develop a bike path in Zion Canyon to protect resources and reduce congestion. The shuttle system was described in detail, including when and where it would be operated, who would be required to use it, and the number and general type of buses used. The environmental assessment (EA) also described support facilities necessary for the shuttle system, including the construction of a new visitor center, parking lots, and a bus maintenance facility. Following public review of the document, the superintendent signed a finding of no significant impact (FONSI) for the proposal, allowing implementation of the plan to begin. Work has subsequently begun on construction of the facilities necessary to support the shuttle bus system. The system is expected to be fully operational in the year 2000. The 1997

transportation system plan, and the resulting actions taken by park management, put some limits on the range of desired conditions and alternatives that could be considered for Zion Canyon in this plan. For example, allowing private vehicles in the canyon during the summer was excluded from consideration during the development of alternatives in this plan. However, some of the alternatives in this plan/EIS provide general directions on the operation of the shuttle system (i.e., the terminus of the shuttle route in the canyon).

ZION NATIONAL PARK GPRA PLANS (1997)

The Government Performance and Results Act (GPRA) directs all federal agencies to produce a strategic plan and annual performance plans. A park strategic plan describes the park's mission, mission goals, and measurable long-term goals, and includes a resource assessment. A park annual performance plan lists annual performance goals (the outcomes expected to be achieved in a given fiscal year) and includes an annual work plan (inputs and outputs) to achieve the annual goals. The Zion park staff completed their first strategic plan and annual work plan in 1997. The planning team used the park mission goals in developing the *Draft General Management Plan / Environmental Impact Statement*. In the future, GPRA plans will tier off of the *General Management Plan*, building on the mission, mission goals, and management prescriptions described here. The adequacy of the *General Management Plan* also will be continually reevaluated in the strategic planning process for Zion.

ZION NATIONAL PARK WATER RIGHTS SETTLEMENT AGREEMENT (1996)

An agreement between the United States, State of Utah, and Water Conservancy Districts from Washington and Kane counties, was signed in December 1996 to settle the water-rights claims for Zion National Park. This agreement was developed as part of the general adjudication of water rights that the state is conducting for the Virgin River Watershed. Both state appropriative rights and federal reserved water rights were recognized for Zion National Park, with the former

being critical for providing water for administrative uses (such as potable water and irrigation), and the latter being essential for the protection of water-dependent resources. Actions proposed as part of this plan must be consistent with decisions made in the water-rights settlement agreement.

ZION NATIONAL PARK INTERPRETIVE PLAN (1996)

This plan describes an interpretive vision for Zion National Park and describes how the National Park Service will provide information about Zion to visitors, orient visitors to the park, and interpret park themes for visitors. An additional purpose of this plan is to provide guidance for subsequent designs of interpretive media, exhibits, and structures. Future updates and implementation of the interpretive plan will be influenced by the desired visitor experiences and resource conditions identified in this plan.

DEVELOPMENT CONCEPT PLAN / ENVIRONMENTAL ASSESSMENT, ZION CANYON HEADQUARTERS AND FINDING OF NO SIGNIFICANT IMPACT (1994)

The development concept plan addressed the future of park developments in the headquarters area and south entrance. The plan focused on reducing vehicular congestion in Zion Canyon. Most of the plan described a proposed shuttle bus system. The development concept plan also called for eventually extending this system to the east side of the park. In addition to transportation, the 1994 plan called for several additional developments, including new employee housing in the Watchman housing area, a permanent research facility, a plant nursery, and an emergency service facility, to be built near the existing park headquarters. Portions of this plan, such as the employee housing directions, were modified by the 1997 *Zion Canyon Transportation System Environmental Assessment*.

RESOURCE MANAGEMENT PLAN, ZION NATIONAL PARK (1994)

The resource management plan tiers off the long-term goals identified in legal mandates, other park

plans, and NPS policies. It is intended to describe how long-term resource goals will be achieved in Zion and thus provides a working foundation for resource management actions in the park. The plan provides an overview of the park's natural, cultural, and physical resources; analyzes resource management needs; and prescribes long-term strategies to address the park's most important resource problems and research needs. The resource management plan identifies specific actions and assigns them priorities. These actions are updated on a regular basis. The existing (1994) resource management plan will be revised as needed to incorporate the management directions provided by this document.

LAND PROTECTION PLAN, ZION NATIONAL PARK (1984)

Land protection plans are developed for each park containing nonfederal lands or interests that may be subject to acquisition. Land acquisition is guided by a park's land protection plan. Zion's land protection plan identified nonfederal lands and interests within the park's boundaries and provided examples of compatible and incompatible uses of those lands. Alternative land protection techniques were examined and evaluated for protecting park values and meeting management objectives. The plan established priorities for acquisition of land or interests within the park boundary and made recommendations for short- and long-term actions. It noted that the National Park Service will not seek to acquire any interest in private lands without the consent of the owner as long as these lands are devoted to uses that are compatible with the park. The action alternatives in the *Draft General Management Plan / Environmental Impact Statement* shows how the National Park Service would like to manage the nonfederal lands within the park boundary if and when they are acquired.

WILD AND SCENIC RIVER REVIEWS IN THE STATE OF UTAH (1996-1997)

In December 1994, the Bureau of Land Management (BLM), U.S. Forest Service, and National Park Service agreed to develop a common process and criteria for determining the eligibility and suitability of Utah rivers for potential inclusion in

the national wild and scenic rivers system. A uniform methodology was published in 1996, which the three agencies are using to prepare wild and scenic river eligibility assessments in the state (USFS et al. 1996). In 1997, the Bureau of Land Management, U.S. Forest Service, National Park Service, and the state of Utah agreed in a memorandum of understanding to cooperate in conducting wild and scenic river studies. The National Park Service and Bureau of Land Management also signed an agreement to conduct joint eligibility determinations and suitability recommendations for six small BLM river segments adjacent to and upstream of Zion. The 1996 interagency eligibility criteria and process were used to assess the rivers and streams in Zion and on the six adjacent BLM segments. The *Draft General Management Plan / Environmental Impact Statement* includes the eligibility determinations for these rivers and streams, as well as suitability determinations for wild and scenic river designations.

DIXIE RESOURCE AREA. PROPOSED RESOURCE MANAGEMENT PLAN AND FINAL ENVIRONMENTAL IMPACT STATEMENT (1998)

This plan establishes land use allocations and management guidelines for Bureau of Land Management (BLM) administered land in the Dixie Resource Area, which indirectly affects much of Zion National Park due to its proximity. The plan primarily focuses on land use prescriptions for BLM lands in Washington County in light of the direct, indirect, and cumulative effects of rapid urban growth. The plan has a 20-year time frame. Management objectives, decisions, and allocations are presented for such topics as land transfers, transportation, recreation, wilderness, livestock grazing, and fish and wildlife habitat. The *Draft General Management Plan / Environmental Impact Statement* is proposing boundary adjustments that would affect several BLM tracts covered by the Dixie Resource Area plan. The National Park Service and Bureau of Land Management also agreed to jointly study the eligibility and suitability for designating several drainages on BLM lands adjacent to the park as wild and scenic rivers. The findings of this study may affect the *Dixie Resource Area Resource Management Plan*.

APPENDIX D: DEFINITIONS OF THE MANAGEMENT ZONES

FRONTCOUNTRY HIGH DEVELOPMENT ZONE

This zone would provide visitors with highly structured opportunities to enjoy and learn about the park by means of motorized, primary roads. In essence, visitors would feel as though they were in a pocket of civilization surrounded by the park's natural beauty. A wide array of visitor services and facilities would be available. The experience would be highly social. Both natural processes and the natural landscape would be highly modified.

Resource Conditions

Natural processes and the landscape would be greatly altered to accommodate visitors and support park operations. Throughout the area, resources may be altered or manipulated whenever necessary to restore damaged areas, preserve/maintain cultural resources, or to direct visitor use and minimize human impacts. All alterations, however, should blend in with the surrounding landscape or facilities to the extent possible.

Visitor Experience

Visitors would view the park landscape from the relative comfort of motor vehicles and highly developed facilities. Transportation, lodging, camping, orientation/information, and a wide variety of other services would be readily available to help visitors learn about and enjoy the park's resources. Visitors would feel secure in a developed environment. The visitor experience generally would be highly social with frequent interaction among visitors and between visitors and park staff. Although there may be some opportunity for solitude at certain times of the day, particularly during the off-peak season, encounters with others would be more likely compared to other management zones. Throughout the year, the only limits on numbers of people or on group size that could be encountered, both day and night, would be due to resource protection concerns or facility design capacities. Visitors would stay

overnight in campgrounds or lodges. Because of the close proximity of facilities and services, visitors would not need to have a high degree of self-reliance or outdoor skills. Travel would occur mainly along primary or secondary roads or on walkways connecting facilities.

Management and Scientific Uses

Most management actions would focus on maintaining facilities and providing high quality visitor experiences, with a secondary focus on mitigating impacts from human use. Actions that may be taken to manage visitors include: directing or limiting use via signs, fences, or pathways; educating visitors; and encouraging behaviors that protect resources and maintain visitor safety. Research and resource management activities also would be permitted, with some restrictions. Many types of equipment would be allowed for scientific and management purposes, although how, when, and where they would be used may be restricted. Fee collection would take place in this zone. For both research and administrative purposes, the number of people would be limited if there are resource protection concerns or by the design capacity of the facilities.

Appropriate Kinds of Activities and Development

Visitors could participate in a wide variety of highly structured and facility-dependent recreational activities. These activities would revolve mainly around going to a visitor center, enjoying motorized sightseeing, and camping in a developed campground or staying overnight in a lodge. Other activities could also include walking, bicycling on roads or designated trails, watching wildlife, and viewing selecting cultural sites. The use of nonmotorized watercraft (e.g., kayaks), climbing, and canyoneering would be permitted, although these activities may be restricted or prohibited at certain times and locations. Horseback use may be allowed in designated areas and at designated times. Nonmotorized winter activities would be permitted on trails and

designated areas. Commercial filming may be permitted provided it is consistent with the desired resource and social conditions described above for the zone. Group activities (e.g., weddings, reunions) may occur with a special use permit.

A broad range of formal interpretive, education, and orientation programs, facilities, and information would be provided in this zone. Guided and self-guided activities may also be provided. For example, slide programs, guided walks and tours, live presentations, exhibits, publications, cooperating association sales (e.g., sales of park/resource-related interpretive materials), and some nature trails could be found here. Educational programs and workshops could also be accommodated (e.g., Junior Ranger program, Elderhostel, painting and photography workshops).

The greatest variety of park-appropriate development would be found in the frontcountry high development zone. Additionally, the greatest number and highest concentration of facilities would be found here. This is the only zone where full-service visitor centers and developed campgrounds (with electricity, sewage/dump stations, and showers) could occur. The existing lodge, gift shop, and restaurant would be in this zone. Sprinkler systems, housing, and exterior lighting also would be permitted in this zone. (Exterior lighting would be the minimum needed for visitor safety in order to minimize impacts on night sky viewing.) Other types of appropriate visitor facilities may include focused visitor facilities, paved or hardened walkways, nature trails and river put-in or take-out sites, rest rooms, developed picnic areas, and interpretive facilities. Several other types of developments, including corrals, barns, entrance stations, utility lines, irrigation systems, diversion dams, and other structures associated with park operations and maintenance, may be permitted in this zone. Culturally significant resources, including historic structures, may be used for administrative purposes.

FRONTCOUNTRY LOW DEVELOPMENT ZONE

Visitors would have a fairly structured rural experience oriented around motorized sightseeing, camping, picnicking, and taking short walks. Basic

facilities and services would be provided, but they would be fewer and less concentrated than in the frontcountry high development zone. There would be few opportunities for solitude, but the social environment would remain uncrowded. Natural conditions would be unmodified in most of the zone.

Resource Condition

Natural processes and landscapes would be unaltered, except within or directly adjacent to the limited number of developed sites. In developed areas, natural processes and landscapes may be altered or manipulated when necessary to restore damaged areas, to preserve or maintain cultural resources, or to direct visitor use to avoid resource impacts. All alterations would be designed to blend in with the natural landscape.

Visitor Experience

In this zone visitors would experience the park while in or near their vehicles and with the aid of some basic services and facilities. Visitors would feel they were part of the natural landscape, while also having the security of knowing other people and facilities are nearby. Sights and sounds of people and some vehicles would be expected. Although there would be few opportunities for solitude and the probability of encountering other people or NPS staff would be moderate, the social experience would be uncrowded. Throughout the year, the only limits on numbers of people or on group size that could be encountered, both day and night, would be due to resource protection concerns or facility design capacities. At night, people could camp in campgrounds, but no lodging would be available. Basic necessities and conveniences would be provided; therefore, visitors would not need a high degree of self-reliance or outdoor skills. Travel generally would be by motor vehicle along secondary roads, or by foot or bicycle on short trails.

Management and Scientific Uses

Management and scientific uses would be the same as described for the frontcountry high development zone.

Appropriate Kinds of Activities and Development

Most activities would be somewhat structured, with the visitor experience oriented around motorized sightseeing, camping in campgrounds, picnicking, and taking short walks. Non-motorized watercraft use, bicycling on roads or designated trails, climbing, canyoneering, viewing selected cultural sites, nonmotorized winter activities, commercial filming, and group activities generally would be permitted, with some restrictions or prohibitions possible. Horseback use may be permitted on designated trails and at designated times; however, the use of horses for overnight trips may be limited or prohibited. A wide range of interpretive, educational, and orientation programs, facilities, and information would be provided, but to a lesser extent than in the frontcountry high development zone. Unlike the frontcountry high development zone, lodging, conferences, food sales, and gift sales would be prohibited. The types of development permitted would be similar to those in the frontcountry high development zone, but they would be less concentrated and generally more primitive. For example, only secondary roads would be present—roads may be paved, but would be designed to maintain the rural setting, with low traffic volumes and slow speeds. Picnic sites (tables) would be limited to a cumulative total of ten sites per zoned area. Campgrounds would not have electricity, sewer/dump stations, or showers. Focused visitor facilities may be present to provide visitors with park orientation/information or to interpret specific park resources. The following types of developments would not be allowed: sprinkler systems, exterior lighting, full-service visitor centers, lodges, gift shops, and restaurants. Existing historical features (e.g., orchards, irrigation ditches) may be maintained. Culturally significant resources, including historical structures, may be used for administrative purposes.

TRANSITION ZONE

The main purpose of this zone would be to allow visitors to view or directly access many of the park's prime resources by means of nonmotorized, well-developed, high-use trails. This area would be primarily for day use, but limited overnight camping may also occur. Only minimal facilities (e.g.,

trails, a few designated campsites) would be present. Visitor use would be concentrated within or near these facilities, leaving the rest of the landscape largely undisturbed and the resources protected.

Resource Conditions

Natural processes would likely be altered to a greater degree than in the primitive and pristine zones, but less so than in the frontcountry high and low development zones. For example, culverts could be constructed to direct the flow of water under a trail, although other types of stream channelization could not occur. (However, channelization could continue in the section of the North Fork of the Virgin River flowing through the main Zion Canyon.) Some parts of the natural landscape may be altered by hardening them or shielding them from impacts (e.g., surfacing trails or campsites, putting in water bars, installing toilets). As in the frontcountry low development zone, natural processes and landscapes may be altered or manipulated in developed areas in the transition zone when necessary to restore damaged areas, to preserve or maintain cultural resources, or to direct visitor use to avoid resource impacts. All alterations would be designed to blend in with the natural landscape.

Visitor Experience

Visitors would have opportunities to view or directly access many of the park's prime resources via well-developed trails. Visitors would have a sense of being in a natural landscape, although during the peak season there would be a low expectation of solitude due to the sights and sounds of other people. The probability of encountering other people and NPS staff would be high, but crowding levels would not keep visitors from reaching desired destinations or viewing outstanding park features. Throughout the year, the only limits on day use—numbers of people or group sizes that could be encountered—would be due to resource protection concerns or facility design capacities. Overnight use could occur only in a few designated walk-in campsites, with overnight group size limited to no more than eight individuals. This zone generally would be closer to conveniences and easier to access than the prim-

itive and pristine zones; therefore, visitors would need only a low to moderate degree of self-reliance and basic outdoor skills. Travel generally would be on foot and largely directed via surfaced trails, and other clearly delineated routes over land or water.

Management and Scientific Uses

Management actions would focus on maintaining visitor facilities, mitigating impacts from human use, and providing for quality visitor experiences. In order to avoid resource impacts, actions may be taken to manage visitors, including designating overnight use areas, directing or limiting use via safety rails or chains, fences, and other barriers, and educating and encouraging behaviors that protect resources and maintain visitor safety. Research and resource management activities also would be permitted, with some restrictions. Most types of equipment and small motorized vehicles that do not exceed the trail widths would be allowed. How, when, and where equipment would be used for management or scientific purposes may be restricted. For both research and administrative purposes, day use group size would be limited by resource protection concerns or facility design capacities; the size of overnight groups would be limited to no more than eight people.

Appropriate Kinds of Activities and Development

Only nonmotorized visitor uses could occur in a transition zone, such as hiking and backpacking. In this zone, day use activities would have precedence over overnight uses. Watercraft use, climbing, and canyoneering, nonmotorized winter activities, viewing selected cultural sites, and commercial filming generally would be permitted, with some restrictions or prohibitions possible. Group activities such as weddings would not be allowed. A moderate range of interpretive services may be available, including formal guided walks, informal patrols, outdoor exhibits and bulletin boards, signs, trail guides, and various educational programs.

The types and level of development in the transition zone would be limited. Appropriate types of visitor facilities would include: designated

campsites; pit toilets; developed trailheads; clearly delineated routes over land or water; surfaced trails, overlooks, and destination points; bridges; and interpretive and informational signs. Management structures would be limited to irrigation ditches, springhead boxes, river gauges, gabions, trail culverts, diversion dams, research exclosures, radio repeaters, fences, safety rails, chains, or other such barricades. Except for historic structures listed or eligible for listing on the National Register of Historic Places, no utility-related structures, cabins or large buildings, or other more developed "frontcountry" facilities would be allowed. Only those roads that allow access to private property would be permitted, although these roads would be gated and open only to landowners and their guests. Culturally significant resources, including historic structures, may be used for administrative purposes.

PRIMITIVE ZONE

This zone would provide better opportunities for visitors to experience wildlands and solitude than the zones described above. The landscape would be largely undisturbed, with natural processes predominating. However, compared to the pristine zone, access would be easier into this zone, there would be signs of people, and the area would feel less remote.

Resource Condition

Natural processes and the landscape would be unaltered in the primitive zone, except for a few minimal developments such as primitive trails and designated campsites. Little evidence of recreational impacts would be tolerated. Resources may be altered or manipulated if necessary to restore areas that have been disturbed. Some resources may be altered to preserve/maintain cultural resources, but such changes would be kept to the minimum extent possible. A few resources also may be manipulated to direct visitors to avoid resource impacts, but they would be subtle and harmonize with the natural environment (e.g., building native plant barriers).

Visitor Experience

Visitors would have opportunities in the primitive zone to experience Zion's wildlands with limited assistance. There would be a sense of being immersed in a natural landscape with a moderate sense of solitude. Natural sights and sounds would be almost all that one sees and hears. The probability of encountering other people and NPS staff would be low to moderate throughout the year. For example, generally a visitor would encounter no more than twelve groups per day. Group sizes for day and overnight use would be limited to eight or fewer individuals (in horse parties, the total number of people and horses combined would not exceed eight). At night people could camp out of sight of others. Because this zone would be farther from conveniences, visitors would need to have a high degree of self-reliance, and more advanced outdoor skills may be necessary (e.g., route-finding or canyoneering ability). However, travel would be largely directed via primitive trails and routes over land and in streams.

Management and Scientific Uses

Most of the management actions in this zone would be devoted to protecting resources, minimizing, or avoiding potential impacts from visitors, and restoring disturbed areas. Actions that may be taken to manage visitors include setting group size limits, designating camping sites, restricting off-trail use, and encouraging behaviors that protect resources. Research and resource management activities would be permitted, with some restrictions. For both research and administrative purposes, all groups would be limited to no more than eight people. Motorized equipment and the use of aircraft to access the zone generally would not be permitted, as per the Wilderness Act and NPS policies.

Appropriate Kinds of Activities and Development

With the exception of interpretive activities and bicycling, the same types of nonmotorized visitor activities described in the transition zone could occur in the primitive zone (although there may be different qualifications, restrictions, or prohibitions

on visitor activities). Only limited opportunities may be provided for formal guided interpretive walks. No bicycling would be permitted. However, horseback riding may be permitted on designated trails and at designated times.

There would be very little development, either to support visitors or for management purposes. Narrow, unpaved trails and/or routes would be maintained (paved trails that existed at the time of zoning are an exception to this rule). Some designated campsites and other facilities may be provided for the purpose of protecting resources rather than for the convenience of visitors (e.g., pit toilets and stream crossings, but not bridges). Some undeveloped river put-in and take-out points may be designated to minimize the potential for resource impacts. Informational/ directional signs also may be provided when deemed necessary for human safety and resource protection; however, interpretive signs would not be present. Some administrative facilities may be maintained if they are needed for parkwide management (e.g., radio repeaters, weather stations, existing water collection devices, river gauges). Culturally significant resources, including historic structures, may be used for administrative purposes.

PRISTINE ZONE

The pristine zone would offer the feeling of being entirely alone in Zion's remote and isolated wildlands. This zone would provide visitors a chance to experience a pristine natural landscape, free of all signs of people, except for faint hiking routes and climbing bolts. Use of these areas would be low, and group encounters infrequent.

Resource Condition

Lands in this zone would be managed to perpetuate natural conditions and processes, undisturbed by people. There would be very little tolerance for uses or actions that would disturb or alter resources and natural processes; the only sign that others have used the area may be faint hiking routes and bolts on climbing routes. However, some resources may be altered or manipulated if necessary to restore areas that have been disturbed, or to preserve/maintain cultural resources.

Visitor Experience

Visitors would have the sense of being immersed in a totally natural landscape. With virtually no evidence of others passing through this zone, some visitors might feel like they were the first humans to explore this area. Only natural sights and sounds would be seen and heard. There would be a strong sense of isolation and remoteness. The probability of encountering other people or NPS staff would be very low throughout the year. For example, visitors would not usually expect to encounter any other groups either during the day or at night. To ensure opportunities for solitude and minimize the potential for resource impacts, the size of groups would be limited to no more than five people. Because visitors would not find conveniences and other people in this zone, they would need to be entirely self-reliant and possess a high level of outdoor skills—route-finding and canyoneering abilities would be essential.

Management and Scientific Use

Management in the pristine zone would be aimed primarily at protecting park resources, while still ensuring that visitors have a high-quality experience. Minimal administrative use would occur, such as restoration of disturbed areas, search and rescue, and monitoring of endangered species. However, providing the type of desired visitor experience would require a high degree of management of visitors outside of the zone. For example, visitor levels would need to be highly managed to ensure that visitor encounters are minimized. If impacts occur due to visitor use, there would be increased management of visitors (e.g., required orientations, use restrictions, temporary closures).

Long-term inventory and monitoring and resource management to mitigate human impacts or preserve cultural resources would occur in this zone. Other types of research may take place if this zone is considered to be the only, or best suitable, area for that research. All research activities would require a project/research proposal that would be subject to internal (National Park Service) and external peer review.

For both research and administrative purposes, the size of groups and the total number of groups

would be the same as described for visitors in this zone. Motorized equipment and the use of aircraft to access the zone generally would not be permitted, as per the Wilderness Act and NPS policy.

Appropriate Activities and Development

Hiking, backpacking, climbing, canyoneering, cross-country skiing, snowshoeing, and nonmotorized watercraft use would be permitted, with restrictions or prohibitions possible at certain times and locations. Commercial filming may be permitted, provided it is consistent with the desired conditions and intent of the zone. No commercial recreational activities, motorized/mechanical uses, or horses would be permitted in order to minimize impacts to other visitors and the resources. Interpretive/educational services also would not be provided in the pristine zone.

No visitor developments, such as constructed or maintained trails, routes, and campsites, signs, or maintained river put-in/take-outs, would be present. However, faint hiking routes and climbing bolts would be permitted. Administrative developments generally would not be permitted, with the possible exception of existing radio repeaters that are essential for parkwide management. Culturally significant resources, including historic structures, may be maintained but would not be used for administrative or other purposes.

RESEARCH NATURAL AREA (RNA)

This zone applies the intent of the national network of “research natural areas,” which are field ecological areas designated primarily for research and education and/or to maintain biological diversity. Research natural area zones would be applied in areas with little to no human disturbance. Baseline inventory and long-term ecological observations would be emphasized in this zone, with the primary purpose of creating an ecological/environmental benchmark over time. This zone would not be open to recreational use, but may be open to educational uses.

Resource Condition

This zone is located in areas that are prime examples of natural ecosystems and areas with significant genetic resources with value for long-term baseline observational studies or as control areas. The areas would exhibit little evidence of human disturbance, although they would be relatively accessible (with the exception of the isolated mesa tops). Limited manipulations may be allowed, provided the intent is to restore the area to more natural conditions (such as when using prescribed fire), or to preserve/maintain significant cultural resources (such as when conducting archaeological research).

Visitor Experience

Any areas included in this designation would be closed to all recreational uses. Educational trips may be authorized under established RNA guidelines, subject to justification, documentation, and internal review.

Management and Scientific Uses

All management and scientific uses in research natural areas would require a project/research proposal that would be subject to internal (National Park Service) and external peer review. Long-term inventory and monitoring, and resource management to mitigate human impacts or preserve cultural resources would occur. Other types of research, sampling, or collection may occur if it is considered to be the only, or best suitable, area for accomplishing the research objectives. Limited administrative uses (e.g., search and rescue) would be permitted, but would be infrequent and last only a short time. For both research and administrative activities, the size of groups would be limited to eight or fewer individuals. The total number of groups would be established as part of the wilderness management and VERP planning processes. Motorized equipment and the use of aircraft to access the zone generally would not be permitted, as per the Wilderness Act and NPS policies.

Appropriate Kinds of Activities and Development

Although this zone would be closed to general public use, some interpretation of the areas may occur outside of the zone, such as explaining the benefits and use of benchmark environmental monitoring sites as land management tools. Camping and trail construction would not be allowed, except to provide essential access to established research facilities. Temporary research equipment (e.g., stream gauging stations, meteorological equipment) would be permitted if there is no practical alternative for achieving research goals, and where consistent with the VERP implementation plan, the Wilderness Act, and other park documents (e.g., the “Resource Management Plan”).

ADMINISTRATION ZONE

The primary purpose of this zone would be to support the management and administration of the park. General visitation would not occur, although some visitors may access these facilities/areas to obtain staff assistance or to solve a problem. The level of facility development and concentration would vary as needed to provide for park operations; the degree of modification of natural processes and landscapes also would vary.

Resource Condition

Natural processes and the landscape would be altered to support park operations; the degree of alteration would be dependent on need. Resources may be altered or manipulated whenever necessary to restore damaged areas, to preserve/maintain cultural resources, or to direct use in order to avoid resource impacts. However, all alterations should blend in visually with the surrounding landscape or facilities to the extent possible.

Visitor Experience

General public visitation would not be encouraged, because this zone would be intended to serve primarily administrative functions. However, some visitors may have access to obtain staff assistance or to solve a problem.

Management and Scientific Uses

Most management activities would be devoted to maintaining park facilities and for park operations. Research and resource management activities would be permitted with some restrictions. Most types of equipment would be allowed for scientific and management purposes, although how, when, and where the equipment is used may be restricted. For both research and administrative purposes, the number of people would be limited if there are resource protection concerns or by the physical capacity of the facilities.

Appropriate Kinds of Activities and Development

Because the public would seldom be in this zone, there would be no interpretive, educational, or orientation facilities or services; however, orientation information, such as signs, may be present to direct visitors where to go for assistance. The type, level, and concentration of administrative facilities would depend on the requirements for park operations, and generally would be the same as in the frontcountry high development zone. Water diversions necessary to satisfy private water rights also would be permitted in this zone.

APPENDIX E: DEVELOPMENT OF THE PLAN

Work on the *Draft General Management Plan / Environmental Impact Statement* (plan/EIS) began in the spring of 1996. The planning team consisted of park staff and interdisciplinary specialists from the Denver Service Center (the planning, design, and construction center for the National Park Service) and the Harpers Ferry Interpretive Design Center. The planning team used the visitor experience and resource protection (VERP) framework in developing the Zion plan/EIS.

The first step in the planning process was to identify the purposes of the plan and mandates and constraints for planning, and to scope the issues and concerns that needed to be addressed in the plan.

The next major step was to develop a range of reasonable alternatives for managing the park and to identify a proposed action for the park. The planning team went through an iterative process in developing the draft alternatives. First, the planning team gathered and analyzed information on existing visitor use and park resources, and identified key issues facing the park. With this information, the team developed an initial range of alternatives for managing the park's visitors and natural and cultural resources. The alternatives were then compared in terms of how well they achieved several criteria. Using this comparison as a starting point, the team developed a proposed action, which reflected the preferred vision for managing the park over the next 20 years. At this point, the team also narrowed the range of alternatives, and revised the remaining alternatives. Throughout the process, newsletters were distributed to share information and to solicit the views and concerns of interested citizens.

ANALYZING EXISTING VISITOR USE AND PARK RESOURCES

To better understand the park and the issues facing it, as well as to understand the options available for resolving the issues, the planning team first analyzed visitor use and resource data. Visitor use statistics such as trends in lodge and campground use, backcountry camping, and vehicle traffic were

gathered and studied. The planning team also estimated day and overnight visitor use levels and distributions in the park based on earlier studies, professional judgment, and data from the existing overnight permit system. Areas where visitors or park staff have noted problems in the past were discussed, as were the probable underlying causes of these problems.

At the same time, natural and cultural resources were evaluated. A computerized geographic information system (GIS) was used to store, display, manipulate and analyze spatial resource data. The sensitivity and value analyses described below incorporated GIS data sets of six cultural and twelve natural resources. The resources are listed below:

Natural Resources

- Bodies of water (ponds, lakes)
- Microbiotic soils
- Streams (rivers, creeks, drainages)
- Soils
- Vegetation types (riparian, mixed coniferous forest, mountain shrub, piñon-juniper, desert scrub, hanging gardens, rock crevice)
- Rare plants
- Virgin River spinedace
- Southwest willow flycatcher
- Desert tortoise
- Bighorn sheep
- Zion snail
- Mexican spotted owl

Cultural Resources

- Anasazi structural features
- Pueblo artifacts
- Lithic scatters
- Rock art
- Pioneer
- Historic National Park Service

Many of the GIS resource layers used in the analyses were created from existing inventories, in-

cluding the Peregrine falcon, Virgin River spinedace, vegetation types, streams, bodies of water, soils, and surface geology layers. However, inventories of all cultural resources and several natural resources (e.g., Mexican spotted owl, desert tortoise, leopard frog, southwest willow flycatcher, bighorn sheep, microbiotic soils) have not been done. GIS models were developed to predict the presence of the resources with less than 100 percent inventories. This resulted in the development of data layers with contiguous and unbroken coverage within the park for all 18 natural and cultural resources used in the analyses.

The accuracy and quality of each data set were assessed to validate the GIS model results. This assessment was based on statistical analyses and professional opinion from park resource management staff and several local area experts. An analysis of resources that are sensitive to human use was conducted using the GIS resource data layers. Maps were created that highlighted park areas sensitive to human use in terms of the cultural resources, natural resources, or both cultural and natural resources combined.

A similar analysis was conducted in which cultural and natural resource values were mapped. Value ratings for each resource were based on set ecological and park significance criteria developed by the park staff. (The soils data layer was used only in the sensitivity analysis because the value of all soil types was considered equal.)

The resource sensitivity and values analyses were later consulted when decisions were made about how to place zones and facilities in different alternatives.

DEVELOPING THE INITIAL RANGE OF ALTERNATIVES

The issues to be covered by the plan and the analysis of existing conditions were two considerations in developing the range of alternatives for management of the park. Other considerations were the park's purposes and significance, the NPS mission and policies, legal mandates, and public input on how the park should be managed.

Development of the draft management alternatives also was guided by several assumptions or "givens:"

- Existing major developments in the park will remain, although their function may change. The Zion-Mt. Carmel Highway, between the south and east entrances of the park, will continue to be maintained and be open to through traffic.
- The main canyon road and facilities up to the lodge area will always be in a frontcountry zone; however, the area north of the lodge could change.
- The Zion Canyon shuttle system is implemented as described in the 1997 Zion Canyon Transportation System Environmental Assessment. With the implementation of the Zion Canyon shuttle system, private vehicles will not be allowed in the canyon during the summer.
- Major new facilities, such as campgrounds, lodges, roads, and visitor centers, will not be built within the park, aside from those associated with the transportation system and possibly a visitor center on the park's east side. The private sector will provide camping facilities outside of the park.
- New park developments proposed in this plan will be built in disturbed areas whenever possible. Mitigation measures will be taken to avoid sensitive areas, such as threatened and endangered species habitats, and archeological sites.
- Activities in a management zone that is within the proposed wilderness will conform to provisions of the Wilderness Act.
- The park's wilderness proposal may be adjusted through this planning process.

One of the first steps in developing the alternatives was to create potential management zones, which describe how different areas of the park can be managed to achieve desired resource and social conditions and serve recreational needs. The planning team identified seven potential management zones: frontcountry high development; frontcountry low development; transition; primitive; pristine; resource reserve; and administration.

The next step was to identify preliminary alternative concepts for management of the park. The concepts form the core of the management alternatives for Zion. They describe possible directions for the future of the park and guide how the management zones would be applied “on the ground” in the park. The planning team identified five preliminary alternative concepts.

The seven management zones and five preliminary alternative concepts were presented for public review and comment in a newsletter.

After receiving the public’s comments, the team revised the management zones and added a new “semiprimitive” zone; the preliminary concepts were not changed. The team then placed the zones “on the ground” in the park in different ways to reflect the five preliminary concepts. For each management concept, the team also developed a list of actions that would be taken to implement the zoning scheme. The end result of this work was the creation of five draft management alternatives:

- alternative A provided additional opportunities for use and access
- alternative B concentrated use in the park
- alternative C reduced use while still providing for a diversity of visitor experiences.
- alternative D emphasized resource protection
- alternative E called for minimal changes to park conditions as they were in 1997

All of the draft management alternatives supported the park’s purposes and significance, addressed the identified issues, and responded to public desires and concerns; however, each alternative differed in the compromises or tradeoffs made between preserving resources and accommodating visitor use.

As required by the National Environmental Policy Act, the National Park Service also developed a sixth no-action alternative. This alternative reflected how the park is currently managed and would be managed in the future if no changes occurred. It also provided a basis for comparing the other alternatives.

The five draft-management alternatives (the “action” alternatives), and the no-action alternative were described in an alternatives workbook. Public

comments, concerns, and ideas were then sought on the alternatives.

DEVELOPING THE PROPOSED ACTION

The next major task in the planning process was developing a proposed action—the NPS preferred approach for managing the park over the next 20 years. In order to develop a preliminary proposed action, the five draft alternatives that had been reviewed by the public were evaluated using an objective analysis process called “Choosing By Advantages” (CBA). This process evaluates different choices (in this case the five preliminary action alternatives) by identifying and comparing the relative advantages of each according to a set of goals and relevant facts.

Only the zoning schemes presented under each of the five management alternatives were considered in Zion’s CBA evaluation, not the specific implementation actions. This is because the zoning schemes describe the desired future conditions for the entire park (the level of visitor use, resource conditions, management activities, etc.) and are expected to remain the same over the life of the plan. The implementation actions, on the other hand, describe how the park staff could meet the desired conditions. These actions could change in the future with the advent of new information and technology.

The first step in the CBA process was to develop the criteria that would be used to compare the alternatives. The criteria were based on park purposes and significance, laws and policies, and the concerns and comments commonly expressed by the public and park staff about the draft management alternatives. The team identified five criteria by which to evaluate the alternatives. The criteria were how well each alternative:

- preserved and protected natural resources and processes
- preserved and protected historic buildings, structures, and features
- preserved and protected known archeological sites
- provided for wilderness values and conditions

- provided for visitor enjoyment and education through a wide range of appropriate visitor opportunities and facilitated visitor access to the park

For each criterion, the team identified the advantages of an alternative based on the specific characteristics or consequences of that alternative (“relevant facts”). Each advantage was given a point value that reflected its importance when compared to the advantages of the other alternatives. By adding up the advantage scores for each alternative, the team was able to determine how the alternatives compared overall.

After completing the CBA scoring for all five draft alternatives, alternatives D and E had the highest total advantage ratings. Alternative E rated lower than D for the goals related to visitor archeological resources and natural resources. The team concluded that alternative D was the closest to the direction a proposed action should take; however, alternative D rated relatively low for the goals related to visitor enjoyment and education, wilderness, and historic resources. Therefore, the team developed a new alternative—the proposed action. This alternative was similar to alternative D, but better provided for visitor enjoyment, improved wilderness conditions and values, and better protected historic resources.

NARROWING THE RANGE OF ALTERNATIVES AND REVISING THE REMAINING ALTERNATIVES

In addition to identifying the proposed action, the planning team used “Choosing By Advantages” and other information to narrow the range of alternatives. After analyzing the advantages of the alternatives relative to each other for achieving park purposes and NPS policies (i.e., preserving and protecting cultural and natural resources, providing for visitor enjoyment and education, providing for wilderness values), the advantages of alternatives B and C were determined to be the same as or better in at least one of the other action alternatives. Neither alternative B or C had the greatest advantage compared to the other alternatives. (Alternative C was the least favored of all the alternatives.) In addition, neither of these alternatives was highly favored by the public based on the responses to the alternatives workbook. The

planning team also was able to include those elements in alternatives B and C with high advantages in the other action alternatives.

Based on further analysis, the planning team also discarded alternative E. Alternative E was dropped because it was almost identical with the proposed action—there were very few differences in the management directions and zoning schemes that distinguished the two alternatives.

The planning team ended up with four alternatives for managing Zion National Park:

- the National Park Service’s proposed action
- alternative A, which provides additional opportunities for use and access
- alternative D (renamed alternative B in this document), which emphasizes resource protection.
- a no-action alternative

Revisions to the Range of Zones and the Alternative Zoning Allocations

After analyzing the alternatives using the CBA process, the planning team revised the original range of zones. The semiprimitive management zone was dropped because the zone did not differ significantly from the primitive management zone other than for use levels. All areas where the semiprimitive zone was applied under each alternative were rezoned as primitive.

The planning team initially had decided to eliminate the existing administratively designated research natural areas in the park, which were set aside to protect the ecological integrity of areas for research purposes. However, after further consideration the team decided to retain this designation. The team consequently developed a new zone that reflects National Park Service direction on the management of research natural areas. This zone, appropriately enough, is called the research natural area zone. The former resource reserve zone was replaced by this new zone.

With the elimination of alternatives B, C, and E, some of the distinctions between how key areas of the park were zoned could have been lost. To

avoid this, the planning team made several changes to zoning schemes (i.e., how the zones were allocated on the ground) for alternatives A and D.

Revisions to the Implementation Actions Component of the Remaining Alternatives

After completing the CBA analysis, the planning team also reviewed the implementation actions that had been described for each alternative in the October 1997 alternatives workbook. The team felt these actions should be better linked to how various areas of the park were zoned under each alternative (i.e., the desired conditions). Therefore, the key actions listed in the workbook were replaced with a description of needed or allowable actions related to how specific areas of the park were zoned (i.e., “zone-specific management strategies”). The planning team felt this information would give the public a more tangible

sense of what the zoning alternatives could mean on-the-ground, an idea of the magnitude of the changes proposed under each alternative, and allow a more meaningful comparison of the alternatives.

General management strategies were also developed to provide more guidance about how visitors, resources, and facilities would be managed parkwide.

Completion of the Draft Plan

After the alternatives were completed, the planning team analyzed the environmental consequences and implications of each of the alternatives. The team subsequently prepared and distributed this *Draft General Management Plan / Environmental Impact Statement*, which includes the four management alternatives and an analysis of their environmental consequences.

APPENDIX F: WILD AND SCENIC RIVER EVALUATION — ELIGIBILITY, CLASSIFICATION, SUITABILITY REPORT

INTRODUCTION

This report presents the results of the National Park Service's (NPS) study of potential wild and scenic rivers in Zion National Park. The purpose of this study is to determine whether any of these rivers should be recommended for inclusion in the national wild and scenic rivers system.

Seven rivers—each including the main stem and major tributaries—were evaluated within the park. These rivers constitute all of the park's major waterways. As per a 1998 Memorandum of Understanding between the NPS and the Bureau of Land Management (BLM), this study also evaluated six short stream segments outside of national park boundaries on lands administered by the BLM. Total river mileage of the six BLM segments is 2.3 miles (see table F-3). These river segments are upstream of and contiguous with the park rivers, and were evaluated along with park rivers in the interest of efficiency and holistic resource management. Wild and scenic river determinations for the BLM segments will constitute a land use plan amendment to the *Dixie Resource Area Resource Management Plan* (1998).

The rivers evaluated were:

- North Fork of the Virgin above and below the Temple of Sinawava
- East Fork Virgin River
- Coal Pits Wash
- North Creek
- La Verkin Creek
- Taylor Creek
- Camp Creek

The North Fork of the Virgin River was evaluated in two segments because the character of the river area changes significantly at the Temple of Sinawava.

Five of the seven rivers (and their tributaries) were found eligible and suitable for inclusion in the National Wild and Scenic River System: the North Fork Virgin River above and below the Temple of Sinawava, the East Fork Virgin River, North Creek, La Verkin Creek, and Taylor Creek.

AUTHORITIES

Authorities and guidelines for the evaluation, designation and protection of wild and scenic rivers include: the Wild and Scenic Rivers Act of 1968 (as amended); the Presidential Directive to All Federal Agencies (August 2, 1979); "National Wild and Scenic Rivers System: Final Revised Guidelines for Eligibility, Classification and Management of River Areas" (1982); NPS Natural Resource Management and Planning Process Guidelines; Special Directive 90-4 (1990); and 43 CFR 8351. Also, specific to Utah: "Wild and Scenic River Review in the State of Utah: Process and Criteria for Interagency Use" (1996); 1997 memorandum of understanding between the National Park Service, Bureau of Land Management, U.S. Forest Service, and the State of Utah concerning wild and scenic river studies in the state of Utah; and a 1998 memorandum of understanding between the National Park Service and Bureau of Land Management concerning wild and scenic river studies.

STUDY PROCESS

All rivers in the park were evaluated. Each river study corridor included the channels of main stem and major tributaries and the adjacent lands one-quarter mile from each riverbank.

The wild and scenic river study process is composed of three steps:

- determine if rivers are eligible as components of the National Wild and Scenic Rivers System

- determine the appropriate classification of eligible rivers
- determine whether the eligible segments would make suitable additions to the National Wild and Scenic Rivers System

Eligibility

The process used to conduct the eligibility assessment is described in “Wild and Scenic River Review in the State of Utah: Process and Criteria for Interagency Use,” July 1996. The process was developed as a collaborative effort between the National Park Service, Forest Service, and Bureau of Land Management. The intent is “to provide a uniform methodology to be used by the three agencies to obtain consistent results in wild and scenic eligibility assessments made during planning efforts in the state of Utah.”

To be eligible for inclusion in the National Wild and Scenic River System, a study segment must be free-flowing and the stream corridor must exhibit at least one “outstandingly remarkable” resource value.

“Free-flowing” means existing in a largely natural condition without major impoundments, diversions, or other modifications of the waterway. There are no specific requirements concerning minimum flow for eligible segments. Flows are considered sufficient for eligibility if they sustain or complement the outstandingly remarkable values for which the segment would be designated. Rivers with intermittent flows have been included in the national system.

Outstandingly remarkable values (ORVs) are scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values that are judged to be regionally significant—those that stand out as among the best on a regional basis. All resources assessed should be directly river-related, or owe their location or existence to the river. Features that are exemplary (outstanding examples of common types), as well as those that are rare or unique, should be considered.

Regional significance was determined within the context of expressly delineated geographic regions specific to each resource being evaluated (see the

maps in exhibit 1). A team of 18 subject matter experts from the public and private sectors was assembled for the task of rating the resource values of each river (see exhibit 2). Criteria were developed to assist in the evaluation of each resource (see exhibit 3). These criteria were rated as follows:

3 = value is one of the most significant in the region

2 = value is typical in the region

1 = value is less significant than most in the region

0 = value is nonexistent

Once all rivers were rated, two methods were used to determine regional significance:

- For each river resource, rating scores for all the criteria were added and averaged as a whole. A total score of 2.5 and higher indicated an outstandingly remarkable resource value.
- For each river resource, rating scores for each criterion were added, averaged, and rounded to the nearest whole number. Resources that scored a 3 on a majority of the criteria were considered outstandingly remarkable.

The results of these two methods were identical. These results were then inspected to ensure the numerical findings made intuitive sense.

Classification

Four factors are evaluated in classifying eligible rivers: water resources development, shoreline development, accessibility, and water quality. The Wild and Scenic Rivers Act specifies three categories of classification:

- Wild river areas are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
- Scenic river areas are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

- Recreational river areas are readily accessible by road or railroad, may have some development along their shorelines, and may have undergone some impoundment or diversion in the past.

Suitability

The suitability phase of the study evaluates whether designation as a national wild and scenic river would be the best way to manage eligible rivers. Suitability considerations include the environmental and economic consequences of designation and the manageability of the river if designated.

INTERIM MANAGEMENT

NPS management of stream segments in the park found to be eligible and suitable is sufficient to protect their eligibility, classification, and suitability, pending action on wild and scenic river designation, from any threats that might conceivably originate within the park.

River segments under BLM management that are found to be eligible and suitable will continue to be protected under the authority of section 202 of the Federal Land Policy and Management Act (FLPMA) until this land use plan amendment to the *Dixie Area Resource Area Resource Management Plan* is finalized. At that time, allocative decisions for protection of suitable segments will supersede previous decisions made in the *Dixie Resource Area Resource Management Plan*.

CORRIDOR RESOURCES

Park Setting

Located on the western extremity of the Colorado Plateau Province in southwestern Utah and encompassing the southern and western perimeter of the Kolob Terrace (a southern extension of the Markagunt Plateau), Zion National Park exhibits outstanding exposures of Permian through Cretaceous rocks. Due to the downcutting of the Virgin River, Zion Canyon provides an outstanding display of Triassic and Jurassic sediments, the

most spectacular of which is the 2,000-foot thick exposure of Navajo sandstone.

Characterized by high plateaus, a maze of narrow canyons, and striking rock towers and mesas, elevations range from 3,700 feet in Zion's southwestern corner to 8,726 feet (Horse Ranch Mountain) in the northern end of the park. This variation in elevation, combined with myriad springs, streams, and intermittent and permanent water sources, has produced a complex and diverse system of flora and fauna.

To this rich environment were drawn prehistoric cultures, most prominently members of the ancestral pueblo people. Earlier Archaic settlement has been suggested by the presence of isolated artifacts. The Southern Paiutes also occupied the area and were in residence when the first European Americans reached southern Utah. Evidence of early Mormon settlement, Depression-era construction projects, and other historically significant structures occur throughout the park.

General Resource Significance

Zion National Park's significance statements describe the importance or distinctiveness of the aggregate of resources in the park:

- The towering, brilliantly colored sandstone cliffs of Zion provide intimate and awe-inspiring scenic and emotional experiences found nowhere else.
- Zion National Park contains one of the last mostly free-flowing river systems contributing to a major canyon formation and riparian community of the Colorado Plateau.
- The numerous narrow and complex canyon systems, in close proximity with sheer cliffs and widely variable topography, create a variety of microhabitats supporting a diversity of sensitive life forms and species adaptations.
- Alcoves, hanging gardens, and grottos nourished by ground water, support unique plants and animal communities, including endemic species.
- The geologic formations, representing several epochs in the formation of the Colorado

Plateau's "Grand Staircase," provides unique educational insights.

- Near pristine archeological evidence of the ancestral pueblo people (Virgin Anasazi) culture is present. Well-preserved sites provide valuable scientific information of local and regional levels.

Water Resources

Water is a key resource in Zion, shaping the landscape and affecting plants, animals, and visitor use. Nearby communities and landowners also rely on the water that flows into and out of the park. Zion's water resources are currently in a relatively natural condition, and consist of perennial, intermittent and ephemeral streams, natural lakes, springs, seeps, wetlands, and *tinajas* (i.e., sandstone depressions that collect water). Stream flows can be heavy during spring runoff and later summer flood events.

Water quality has not been documented for most water resources in Zion. While most waters are thought to reflect near-natural water quality conditions, some degradation from development and land use practices in the park, and higher in the watershed, may be occurring. Even under completely natural conditions, these waters require treatment before being used for drinking.

Water rights for the park are mutually recognized in the recent Zion National Park Water Rights Settlement Agreement (1997) by the U.S. Department of the Interior, State of Utah, and Water Conservancy Districts from Washington and Kane counties. This agreement will help ensure that flow patterns and discharges of streams, springs, and groundwater are maintained, while also providing for the use of water for park administrative purposes and protecting the rights of other water users.

Geology

The geology of Zion is one of the primary purposes for which Mukuntuweap National Monument was initially established in 1909. Sedimentation initially helped to create Zion National Park, with environmental conditions

ranging from oceans to coastal flood plain to river flood plains and channels. Following this, lakes, swamps, and desert dunes made up the scene. Volcanoes deposited ash and sediments that were washed down from the highlands. Periods of alternating deposition and encroaching sea and marine beds continued through the remainder of the Jurassic and Cretaceous periods.

About 13 million years ago, the Colorado Plateau uplift resumed, accompanied by profound erosion. With increased gradients, rivers could carry greater loads, resulting in extreme downcutting and widening. This process is primarily responsible for the formation of Zion's spectacular canyons and riverbeds. Today, the canyons continue to erode through surface runoff and groundwater percolation.

These canyons and their rivers are a chief attraction for park visitors, who marvel at the vertical canyon walls that, in some places, rise upward 1,500 feet from the canyon floor. The canyons are especially popular in the hot summer months when people seek shelter from the high temperatures and glaring sunshine.

Wildlife

Five animals on the federal threatened and endangered list are found within the park: American peregrine falcon, bald eagle, Mexican spotted owl, southwestern willow flycatcher, and the desert tortoise.

Other wildlife species that may depend on canyon or riverine environments include desert bighorn sheep, mountain lions, mule deer, bats, a year-round breeding bird population (with approximately 75 percent of the Neotropical migrant bird species occurring in riparian habitats), 26 confirmed species of reptiles, and six confirmed species of amphibians.

Several invertebrate groups in Zion have been studied to varying degrees, and species lists have been developed. Twenty-six species of snails are now listed within the park, but the only species studied in depth is the Zion snail, an endemic found only in upper Zion Canyon. Information on aquatic invertebrates is helpful in assessing water quality.

Fish

Eight fish species are present in the park, including three nonnative species of trout. Despite this, the native fish communities are relatively intact and include suitable habitat for two species (Virgin spinedace and the flannelmouth sucker) whose abundance has declined rapidly in recent years due to habitat alteration throughout much of their ranges.

The Virgin spinedace, abundant in the Virgin River drainage as recently as 20 years ago, is now in danger of disappearing, and was proposed for listing as a threatened species in 1993. In lieu of listing, a conservation agreement was prepared in 1993 between numerous federal, state, and local agencies, including Zion National Park. This agreement identifies steps required and responsible parties, to assure adequate habitat and survival of the spinedace. Within the park, currently the spinedace are found most abundantly in the East Fork Virgin River and Shunes Creek, with smaller populations occurring in the North Fork Virgin River and North Creek.

Ecology/Vegetation

Zion National Park is situated near the western margin of the Colorado Plateau, where its waters drain into the Mohave Desert, via the Virgin River. The Great Basin is immediately adjacent to the northwest of the Kolob portion of the park. The park's lowest elevation is Coal Pits Wash at about 3,800 feet, and the highest elevation is the summit of Horse Ranch Mountain at 8,926 feet. This 5,000-foot range in elevation supports vegetative communities from the Colorado Plateau, Mohave desert, and the Great Basin.

Riparian and aquatic vegetation comprise an important segment of the park's vegetation. These riparian areas support the richest flora and avian fauna in the park. Zion's riparian areas have been studied to identify prevalent species and management of these species (Harper, Sanderson, and McArthur 1988). More than 25 known rare or endemic plants occur in the park.

Fremont cottonwood, velvet ash, and other water loving trees and shrubs grow along the rivers and streams and around seeps and springs. Wet

sandstone walls found in many of the canyons support peculiar plant communities called hanging gardens. The gardens support maidenhair fern, Zion shooting star, Cardinal monkeyflower, yellow and red columbine, Zion daisy, and other water loving plants.

Cultural/Historical

Zion National Park has a variety of cultural resources from a wide range of time periods. Prehistoric occupations began several thousand years ago and continued up to the eighteenth century. These occupations included the people of the Archaic, Basket Maker and Ancestral Pueblo, and Southern Paiute cultures. Most of the prehistoric remains in the park belong to the ancestral pueblo (also known as the Virgin Anasazi) culture.

In historic time, the Mormon Church's colonization efforts dominated the region. Settlements of this period are located on the margins of the park, with remnants scattered throughout the park. When Mukuntuweap (Zion) National Monument was established in 1909, many of the pioneer families were still farming small irrigated plots of land. Later, activities relating to the establishment, development, and expansion of the park dominated the area.

Historic trails, tunnels, roads, bridges, and buildings in the park are products of the "NPS-Rustic" style of landscape and engineering design that dominated National Park Service construction throughout the 1920s and 1930s. Excellent examples of this architectural style can be seen along the Zion-Mt. Carmel Highway, the Grotto picnic area, the NPS maintenance yard, and in the Oak Creek and Pine Creek residential areas.

The early 1950s mark the close of the historic period, as younger resources do not meet the 50-year cut-off established by the National Register of Historic Places. However, management actions continue to create cultural change, and significant resources will continue to be added to the National Register as appropriate.

Scenery

Due to its diverse landscape and topography, Zion National Park provides opportunities for a wide variety of scenic views. Looking down into some of the canyons from above provides excellent views of sharply incised canyons with panoramic vistas looming in the background. Views from within the canyons are on a much more intimate scale, with canyon walls sometimes as narrow as 2 feet, with vertical relief up to 1,500 feet. Lush hanging gardens and splendid displays of wildflowers often cling to canyon walls, creating a unique combination of colors and textures. Rock art and archaeological sites can sometimes be viewed from within or above the canyons.

In several areas of the park, there are varying combinations of sedimentary rock and igneous rock from volcanic periods, creating interesting color, shape, and texture associations. Throughout much of the park, towering red sandstone canyon walls mark a sharp contrast to the flowing rivers that created them. Many named features such as the Great White Throne, Angel's Landing, and the Temple of Sinawava, attract special interest and provide excellent opportunities for photography.

Recreation

Recreation visitation to Zion National Park has increased steadily since designation, and now averages 2.5 million people per year. Many people visit the park as part of the circle tour of the southwest. Visitor surveys indicate that Zion canyon receives the heaviest use, followed by the east side of the park along the Zion-Mt. Carmel Highway, and Kolob Canyons to the north. The primary activities sought by visitors in these areas are sightseeing, picnicking, hiking, photography, swimming/wading, camping, and concessioner horseback riding tours.

Backcountry use has increased dramatically since the mid-1980s. Several areas in the park now have designated campsites, and an annual monitoring program tracks site conditions. Within the Narrows and the Left Fork of North Creek, restrictions on the number of through day-hikers have been implemented. During the warm months (May-September), visitors tend to congregate in the water-filled canyons, particularly the North Fork

of the Virgin River, the Left and Right Forks of North Creek, Middle Fork Taylor Creek, and La Verkin Creek.

Canyoneering is the fastest-growing activity in the backcountry, and the impacts on the resources and the hiker experience have increased accordingly.

ELIGIBILITY

Five rivers were found eligible for inclusion in the national wild and scenic rivers system: the North Fork Virgin River above and below the Temple of Sinawava, the East Fork Virgin River, North Creek, La Verkin Creek, and Taylor Creek. The segments of the North and East Forks, Taylor Creek, and La Verkin Creek on adjacent BLM lands were all found eligible, except for the upstream 1.7 mile portion of Shunes Creek (tributary to the East Fork), from the Kane County line to the dry waterfall. These rivers were found to be free-flowing, and exhibited at least one outstandingly remarkable resource value. Coal Pits Wash and Camp Creek are ineligible because they lack outstandingly remarkable resources.

Table F-1 illustrates the results of the rating process. Values of "3" indicate outstandingly remarkable resources. Following the table, the outstandingly remarkable resource values are listed for each eligible river, along with the criteria for which the resource values were judged to be regionally significant. Comments provided by subject matter experts are included to provide some insight into the thought process of members of the rating team.

Determinations of outstanding remarkable values pertain to each river as a whole. There may be reaches of main stem and/or tributaries that exhibit the value to a lesser extent.

North Fork of the Virgin River above the Temple of Sinawava

Geology. *Value is one of the most significant in the region for geologic/hydrologic feature abundance, diversity of features, and educational/scientific value.*

Table F-1: Resource Value Ratings

| | Cultural/ Historic | Geology | Wildlife | Fish | Ecology/ Vegetation | Recreation | Scenery |
|---|-----------------------|---------|----------|------|------------------------|------------|---------|
| N. Fork Virgin, above Temple | 0 | 3 | 2 | 2 | 3 | 2 | 3 |
| N. Fork Virgin, below Temple | 2 | 3 | 3 | 3 | 2 | 2 | 2 |
| East Fork Virgin River | 3 | 2 | 3 | 3 | 3 | 3 | 3 |
| Coal Pits Wash | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| North Creek | 1 | 3 | 3 | 3 | 2 | 2 | 3 |
| La Verkin Creek | 1 | 3 | 2 | 1 | 2 | 2 | 2 |
| Taylor Creek | 1 | 3 | 2 | 1 | 2 | 2 | 2 |
| Camp Creek | 1 | 2 | 2 | 1 | 2 | 2 | 2 |
| Rating Legend: 3 = value is one of the most significant in the region 2 = value is typical in the region 1 = value is less significant than most in the region 0 = value is non-existent | | | | | | | |

- This section of river has spectacular exposures of the Navajo sandstone. Though excellent Navajo exposures are common, there are few if any other locations where the entire thickness of the formation is exposed in an almost vertical cut with 100 percent exposures. The erosional features associated with the unusually rapid downcutting of the Virgin River are also spectacular. There are also excellent examples of joint-controlled erosion.
- [The geology value in this segment is the] "best in the world."

Ecology/Vegetation. *Value is one of the most significant in the region for species diversity, riparian habitat quality, ecological function, rare communities, and educational/scientific value.*

- One of the most significant examples of an inverted valley in existence. It harbors a phalanx of plants more typical of higher elevations [along with] an absence of livestock and associated impacts.
- [It contains] "rare hanging gardens and other unique vegetation."
- "Natural processes are largely unimpeded."

Scenic. Value is one of the most significant in the region for diversity of view and special features.

- "Canyon walls are up to 1,500 feet high, with a width of less than 25" in some areas. Rich red sandstone walls and dark desert varnish

contribute to color and texture variety. Big Springs is one of the most spectacular hanging gardens anywhere, and provides a very interesting visual combination and contrast of lush greenery and abundant wildflowers in a narrow sandstone canyon. This is one of the most popular hikes in the park, as well as the region, for its outstanding scenic qualities."

- "Great contrast in soil, rock, and vegetation from the top to the Temple — from ponderosa and piñon to cottonwoods and willows, and from high plateaus with wide vistas to a deep, narrow canyon. The Narrows itself is memorable and rare for its visual qualities—in particular, the play of light and shadow on the walls, a feature enhanced by the echoing sounds of cascading water in the narrow gorge. Here, probably more than in any other section, water dominates the physical characteristics and shapes the experience a hiker has."

North Fork of the Virgin River Below the Temple

NOTE: The North Fork's main stem channel exhibits the greatest modification of any reach in the park. Structures include a mile of gabion basket armoring on the east riverbank, as well as smaller areas of riprap, two grade control structures, and a concrete retaining wall at the site of a recent landslide. However, in the context of the entire 10-mile main stem reach, these

modifications are minor. The river still flows in a largely natural condition, and therefore meets the definition of “free-flowing” as a requirement for eligibility.

Geology. *Value is one of the most significant in the region for geologic/hydrologic feature abundance, diversity of features, and educational/scientific value.*

- The geologic value lies in the number and variety of geologic features that are very well exposed in a relatively small geographic area. These include: near 100 percent exposures of the Moenave, Kayenta, Navajo, Temple Cap, and part of the Carmel Formations; three dimensional views of some of these units due to the side canyons which allow better study of depositional and facies relationships; very visual examples of the variation in the erosional characteristics of units ranging from massive sandstone to clayey shales; excellent examples of landslides and rockfalls caused by undercutting incompetent units combined with oversteepening by a rapidly downcutting river — the landslide and associated lake deposits just above the junction are probably the best exposed and most easily visualized example of this type of feature anywhere in the area. They are a favorite of geologists and geology students.
- [The geologic value of this segment is the] “best in the world.”

Wildlife. *Value is one of the most significant in the region for species diversity, species abundance, natural reproduction, and wildlife viewing.*

- [There is an] “unbroken stand of mature cottonwood (and) crucial nesting habitat for peregrine falcons and Mexican spotted owls.”
- “Wildlife diversity and abundance are high through this segment.”

Fish. *Value is one of the most significant in the region for habitat quality, species diversity, natural reproduction, and species abundance.*

- “The fish community is in excellent condition. The segment harbors more abundant spinedace populations than are found elsewhere.”

- “Has abundance and good distribution of pools, runs, and riffles. Still a fair amount of shading by vegetation and bank overhangs.”
- Species diversity and abundance is high—all four native species (spinedace, speckled dace, desert sucker, and flannelmouth sucker) are there in abundance.”
- “Annual fish shocking numbers are good, and research shows good numbers in the appropriate habitat types.”
- “Natural reproduction is high, as all four species are reproducing in great numbers.”
- “Numerous small size fish are found during shocking, and it is difficult to avoid seining of juveniles.”

East Fork of the Virgin River

Cultural/Historical. *Value is one of the most significant in the region for cultural/historical significance, site integrity, data potential, educational/interpretative values, and is formally designated a National Register Archeological District.*

- The river has a “good concentration of substantial ancestral pueblo sites under NPS protection” and “numerous sites with intact subsurface deposits, outstanding educational and interpretive opportunities, and an outstanding volume of data.”

Wildlife. *Value is one of the most significant in the region for habitat quality, species diversity, species abundance, natural reproduction, and wildlife viewing.*

- This river includes “important habitat for a variety of wildlife, including peregrine falcons and willow flycatchers. Species diversity and abundance are high throughout this segment.”
- “Wildlife viewing potential is best in the region—opportunities to see at least 15 species of birds, four to five species of lizards, mountain lions, peregrine falcons, golden eagles, and bighorn sheep.”

Fish. *Value is one of the most significant in the region for habitat quality, species diversity, natural reproduction, and species abundance.*

- “The fish community is in excellent condition. [Below the falls], the segment harbors more abundant spinedace populations than are found elsewhere, above the falls only speckled dace occur.”
- “One of the only truly free-flowing stretches of the Virgin in the park, containing good proportions of runs, riffles, and pools still exhibiting natural dynamics.”
- “Good amount of shading due to vegetation. Vegetation is still reproducing naturally, with lots of diversity of habitat types.”
- “All four native species are present in tremendous abundance.”
- “Annual fall monitoring results show this river to have the highest abundance in the region, as well as having some of the highest numbers of juvenile fish (natural reproduction).”

Ecology/Vegetation. *Value is one of the most significant in the region for species diversity, riparian habitat quality, ecological function, and educational/scientific value.*

- Within the park, this river has an “absence of livestock and associated impacts” and “rare hanging gardens, and other unique vegetation.” “This river segment contains at least two rare plant populations. It is the best example of native riparian vegetation and processes in the park.”

Recreational. *Value is one of the most significant in the region for recreational diversity, experience quality, and social setting.*

- This river is “historic, [with] river snakes (meanders), habitats, hanging gardens, and boulder falls.”
- “The length of season for recreational opportunities in this canyon is higher than most in the region due to its low elevation. Additionally, this canyon offers a diversity of recreational opportunities, from moderate canyoneering to easy hiking in flat terrain.”
- “This river provides an opportunity for a very unique experience, in that if/when opened to recreational use, it could be strictly limited to provide the highest degree of resource protection and visitor solitude.”

Scenic. *Value is one of the most significant in the region for diversity of view and special features.*

- This canyon is truly remarkable especially for its upper sections. It has high relief, surface variations, rich color combinations, contrasts in soils, rock, vegetation, great cascading water and gorges, and narrow slots. This section is both memorable and rare in the region.”

North Creek

Geology. *Value is one of the most significant in the region for geologic/hydrologic feature abundance, diversity of features, and educational/scientific value.*

- “Extensive excellent exposures of the geologic formations, primarily the Moenave, Kayenta, and Navajo Sandstone, in this area. The most unique feature in this area is the unusually thick stack of basalt flows (about 500 feet thick) in the area near Grapevine spring near the confluence of Left Fork and Right Fork. [The subject matter expert] knows of no other area where basalt flows have stacked up in this manner, for reasons that are not understood. Right Fork also has perhaps the second best example of a landslide, or basalt flow, dammed lake. The lake deposits have yielded some valuable vertebrate fossils. The thin basalt-capped ridge followed by the road near the west park boundary is also one of the best examples of an inverted valley in the area.”

Wildlife. *Value is one of the most significant in the region for habitat quality, species diversity, species abundance, natural reproduction, and wildlife viewing.*

- [The river corridor includes] “a good variety of wildlife habitats and high species diversity.”

Fish. *Value is one of the most significant in the region for habitat quality, species diversity, natural reproduction, and species abundance.*

- “The fish community is in excellent condition. The segment harbors more abundant spinedace populations than are found elsewhere.”

Scenic. *Value is one of the most significant in the region for diversity of view and special features.*

- “The Left Fork is particularly diverse in scenic views, beginning at the initial descent across spectacular crossbedding (variations in color and texture), down Russell Gulch into the ‘Left Fork of North Creek.’ Clear, deep potholes, the characteristic ‘subway’ curvation of the canyon walls and the slot ‘subway tracks’ are very unique in the region.”
- “Hanging gardens in the Right Fork are richly diverse and complex. The slot canyons, coupled with the wide canyon vistas in the first and last sections of the canyon, make this area extremely diverse.”
- “The upper section is particularly worthy of above average regional significance. High relief and surface variations meld well with the contrast in soils, rock, vegetation, and cascading water.”

La Verkin Creek

Geology. *Value is one of the most significant in the region for geologic/hydrologic feature abundance, diversity of features, and educational/scientific value.*

Taylor Creek

Geology. *Value is one of the most significant in the region for geologic/hydrologic feature abundance and educational/scientific value.*

CLASSIFICATION

Proposed classifications for the six rivers are listed in table F-2. Tributaries are listed beneath main stems.

SUITABILITY

All five eligible rivers, including the eligible portions of the six BLM segments, were found suitable for inclusion in the national wild and scenic rivers system.

Characteristics That Do or Do Not Make the Area a Worthy Addition

The rivers of Zion National Park exhibit numerous narrow and complex canyon systems in close proximity with sheer cliffs and widely variable topography, creating a variety of microhabitats supporting a diversity of life forms. Cultural resources from a wide range of time periods are present, and the river corridors provide a valuable recreational resource.

Each of the five eligible rivers has at least one exceptional natural, cultural, or recreational resource value, and most of the rivers have several of these values. As of yet, this region of the country, with its dramatic desert and canyon rivers, is very poorly represented in the national system. Hence, these rivers would make a valuable addition to the national wild and scenic rivers system.

Landownership

Ninety-seven percent of the river corridors found suitable are federally owned, including all of the East Fork Virgin River and both segments of the North Fork of the Virgin River (table F-3). Seven percent of La Verkin Creek, Four percent of North Creek, and one percent of Taylor Creek are private inholdings, totaling about four river miles. There are no private inholdings along the BLM segments.

Current Uses

The primary uses of Zion’s river canyons are recreational. In the backcountry, (where the majority of the study river mileage is located), hiking, camping, and canyoneering predominate. For the most part, these river canyons cannot be seen unless one hikes into them. Along the road-accessible reach of the North Fork below the Temple, other recreational uses occur such as automobile sightseeing, picnicking, wading/swimming, and horseback riding. Also in the corridor along this reach of the North Fork are Zion Lodge (a concession offering lodging, food services and guided tours) and several NPS facilities, including the park visitor center, employee housing, water storage and maintenance facilities, as well as park campgrounds.

Table F-2: Proposed Classification

| North Fork Virgin, above Temple | Wild | North Creek | Wild |
|---|---------------------|--|-------------|
| Kolob Creek (incl. BLM segment) | Wild | Wildcat Canyon | Wild |
| Goose Creek (incl. BLM segment) | Wild | Right Fork | Wild |
| Imlay Creek | Wild | Left Fork | Wild |
| Orderville Canyon | Wild | Grapevine Wash | Scenic |
| Deep Creek | Wild | Wolf Springs Wash | Scenic |
| Mystery Canyon | Wild | Pine Spring Wash | Scenic |
| North Fork Virgin, below Temple | Recreational | Little Creek | Wild |
| Birch Creek Canyon | Wild | Russell Gulch | Wild |
| Pine Creek | Wild | La Verkin Creek | Wild |
| Oak Creek | Recreational | Willis Creek (incl. BLM segment) | Wild |
| Heaps Canyon | Wild | Beartrap Canyon (incl. BLM seg.) | Wild |
| Behunin Canyon | Wild | Currant Creek | Wild |
| Echo Canyon | Wild | Cane Creek | Wild |
| Clear Creek | Recreational | Timber Creek | Wild |
| East Fork Virgin River | Wild | Hop Valley Creek | Wild |
| Shunes Creek (incl BLM segment) excluding the segment from the water diversion to the western park boundary | Wild | Taylor Creek | Wild |
| Shunes Creek from the western park boundary to the water diversion | Recreational | North Fork | Wild |
| | | Middle Fork from the park's eastern boundary for 1 mile along the Kolob Canyons Road | Scenic |
| | | Remainder of the Middle Fork (including BLM segment) | Wild |
| | | South Fork | Wild |

Private inholdings within the park's river corridors receive some grazing use. There is a private water right located on the lower end of Shunes Creek, stretching from the park boundary southeast for approximately three-quarters of a mile.

Current authorized uses along eligible BLM segments corridors include summer sheep grazing on the Taylor Creek segment (Cedar Mountain Allotment) and authorized nonuse for cattle on the Shunes Creek segment (Grapevine Allotment). Dispersed outdoor recreation including hiking, hunting, and fishing occurs on all segments. The geology, isolation, and poor accessibility of these small land tracts limits their multiple-use capacity.

Uses and Resources Enhanced, Curtailed, and Foreclosed

Wild and scenic designation would have little if any effect on uses within Zion National Park. The park is already administered for protection of the outstandingly remarkable resources, and construction of new dams is extremely unlikely.

No uses would be foreclosed or curtailed because of the designation.

The same is true for the BLM segments. Impacts from suitability determinations would not change current uses, nor would it be expected to curtail or foreclose future uses, as none have been proposed in these areas. Protective measures that would limit or foreclose future development are already in place for four segments that fall within wilderness study areas.

Existing Resource Protection

Zion National Park was established to

- Preserve the dynamic natural processes of canyon formation as an extraordinary example of canyon erosion
- Preserve and protect the scenic beauty and unique geologic features, labyrinth of remarkable canyons, volcanic phenomena, fossiliferous deposits, brilliantly colored strata, and rare sedimentation

Table F-3: River Mileage and Landownership of Suitable Rivers

| | Flow | River Miles | | | | % Federal Ownership | Proposed Boundary |
|--|------|--------------|--------------|------------|------------|---------------------|-------------------|
| | | Total | NPS | BLM | Private | | |
| North Fork Virgin, above Temple | P | 10.0 | 10.0 | - | - | 100 | Rim-to-rim |
| Kolob Creek | P | 3.3 | 2.9 | 0.4 | - | 100 | Rim-to-rim |
| Goose Creek | I,P | 4.6 | 4.2 | 0.4 | - | 100 | Rim-to-rim |
| Imlay Creek | P | 2.7 | 2.7 | - | - | 100 | Rim-to-rim |
| Orderville Canyon | P | 3.5 | 3.5 | - | - | 100 | Rim-to-rim |
| Deep Creek | P | 0.8 | 0.8 | - | - | 100 | Rim-to-rim |
| Mystery Canyon | I | 1.4 | 1.4 | - | - | 100 | Rim-to-rim |
| Subtotal | | 26.3 | 25.5 | 0.8 | 0 | 100% | |
| North Fork Virgin, below Temple | P | 8.0 | 8.0 | - | - | 100 | ½ mile |
| Birch Creek Canyon | P | 2.3 | 2.3 | - | - | 100 | ½ mile |
| Pine Creek | I,P | 4.6 | 4.6 | - | - | 100 | Rim-to-rim |
| Oak Creek | I | 2.8 | 2.8 | - | - | 100 | ½ mile |
| Heaps Canyon | E | 2.8 | 2.8 | - | - | 100 | Rim-to-rim |
| Behunin Canyon | E | 1.9 | 1.9 | - | - | 100 | Rim-to-rim |
| Echo Canyon | I | 2.5 | 2.5 | - | - | 100 | Rim-to-rim |
| Clear Creek | E | 6.4 | 6.4 | - | - | 100 | Rim-to-rim |
| Subtotal | | 31.3 | 31.3 | 0 | 0 | 100% | |
| East Fork Virgin River | P | 8.0 | 8.0 | - | - | 100 | ½ mile |
| Shunes Creek | P,I | 3.0 | 2.0 | 1.0 | - | 100 | ½ mile |
| Subtotal | | 11.0 | 10.0 | 1.0 | 0 | 100% | |
| North Creek | P | 17.5 | 17.5 | - | - | 100 | Rim-to-rim |
| Wildcat Canyon | I | 2.8 | 2.8 | - | - | 100 | Rim-to-rim |
| Right Fork | P | 9.1 | 9.1 | - | - | 100 | Rim-to-rim |
| Left Fork | P | 7.5 | 7.5 | - | - | 100 | rim-to-rim |
| Grapevine Wash | E,P | 3.0 | 2.6 | - | 0.4 | 86 | ½ mile |
| Wolf Springs Wash | I | 1.9 | 1.4 | - | 0.5 | 73 | ½ mile |
| Pine Spring Wash | I,P | 6.0 | 4.6 | - | 1.4 | 77 | ½ mile |
| Little Creek | P | 7.1 | 7.1 | - | - | 100 | ½ mile |
| Russell Gulch | I | 2.0 | 2.0 | - | - | 100 | rim-to-rim |
| Subtotal | | 56.9 | 54.6 | 0 | 2.3 | 96% | |
| La Verkin Creek | P | 8.7 | 8.7 | - | - | 100 | ½ mile |
| Willis Creek | I | 1.9 | 1.6 | 0.3 | - | 100 | rim-to-rim |
| Beartrap Canyon | P | 2.3 | 2.2 | 0.1 | - | 100 | rim-to-rim |
| Timber Creek | I | 3.1 | 3.1 | - | - | 100 | ½ mile |
| Currant Creek | P | 1.6 | 1.4 | - | .2 | 89 | rim-to-rim |
| Cane Creek | P | 1.1 | 0.6 | - | .5 | 55 | rim-to-rim |
| Hop Valley Creek | P,I | 4.3 | 3.3 | - | 1.0 | 77 | ½ mile |
| Subtotal | | 23.0 | 20.9 | 0.4 | 1.7 | 91% | |
| Taylor Creek | P | 4.6 | 4.6 | - | 0.1 | 98 | rim-to-rim |
| North Fork | - | 2.0 | 2.0 | - | - | 100 | rim-to-rim |
| Middle Fork | P | 2.0 | 2.0 | 0.1 | - | 100 | rim-to-rim |
| South Fork | - | 1.5 | 1.5 | - | - | 100 | rim-to-rim |
| Totals | | 158.7 | 152.3 | 2.3 | 4.1 | 98% | |

Notes:

Bold face indicates the main stem. Tributaries are listed beneath.

"Flow" refers to hydrologic status as either (P)perennial, (I)intermittent, or (E)ephemeral.

- Goose Creek is intermittent in upper 2/3 of segment, perennial in lower 1/3.
- Pine Creek is intermittent above the slot canyon, perennial from slot canyon down.
- Grapevine Wash is ephemeral above Grapevine Spring, perennial below the spring.
- Pine Spring Wash is intermittent above spring, perennial below spring.

Proposed boundaries, if designated, are based upon canyon topography.

- Preserve the archeological features that pertain to the prehistoric races of America and the ancestral Indian Tribes
- Preserve the entire area intact for the purpose of scientific research
- Provide a variety of opportunities for visitors to learn about and enjoy the resources without degrading those resources

Zion's clear management mandate is to protect park resources, including the resources found in the river corridors. This mandate is based upon the park's enabling legislation (41 Stat. 356 and 70 Stat. 527) and legislative history, the NPS Organic Act (16 USC 1), and *NPS Management Policies* (NPS 1988).

Regarding private inholdings, the "Zion National Park Land Protection Plan" (NPS 1984) allows little change in the current, minimal development and use of these lands. Listed as incompatible uses are: improving undeveloped land; major alterations to existing structures or new construction; intensification of current use; subdivision; creation of hazards to the public or to wildlife; and any activity that adversely impacts park resources. The land protection plan lays out the action that the park staff will take to deal with any incompatible use. These restrictions more than adequately guarantee the continued natural character, and existing classification, of the river corridors.

In addition, in many cases the extreme topography of the river canyons limits development and use, regardless of ownership.

For the BLM segments, in addition to resource protection measures cited above, the *Dixie Resource Area Proposed Resource Management Plan / Final Environmental Impact Statement* (BLM 1998) directs management as portrayed in table F-4 below.

Federal Water Reserved Rights

A determination by the National Park Service of eligibility and suitability for the inclusion of rivers within Zion National Park to the wild and scenic rivers system does not create new water rights for the park. Federal reserved water rights for new components of the wild and scenic rivers system are established by Congress through amendment of the Wild and Scenic Rivers Act. When a river component is added to the wild and scenic rivers system, water is reserved, from water that is not appropriated at the time of designation, in the amount necessary to protect the features which led to the river's inclusion in the system.

River flow in Zion National Park is protected by federal reserved water rights recognized under the Zion National Park Water Rights Settlement Agreement among the United States, Utah, the Washington County Water Conservancy District, and the Kane County Water Conservancy District.

Table F-4: Existing Resource Protection on BLM Segments

| | Taylor Creek | Willis Creek | Bear Trap Canyon. | Kolob Narrows | Goose Creek | Shunes Creek |
|---|---------------------|-------------------------|--------------------------|-------------------------|-------------------------|---------------------|
| Off-Highway Vehicles | Closed | Existing roads & trails | Closed | Existing roads & trails | Existing roads & trails | Closed |
| Fluid Minerals | Category 3 | Open | Category 3 | Open | Category 2 | Category 3 |
| Locatable Minerals | Plan of Operation | Open | Plan of Operation | Open | Open | Plan of Operation |
| Mineral Materials | Closed | Open | Closed | Closed | Closed | Closed |
| Mountain Bikes | Closed | Open | Closed | Open | Open | Closed |
| Right-of-Way | Avoidance | Avoidance | Avoidance | Avoidance | Avoidance | Avoidance |
| Fuelwood | Closed | Closed | Closed | Closed | Closed | Closed |
| Visual Resources | Class II | Class II | Class II | Class II | Class II | Class I |
| Wilderness Study Area | Yes | No | Yes | No | Yes | Yes |
| Area of Critical Environmental Concern | No | No | No | No | No | Yes |
| Special Recreation Management Area | No | No | No | Yes | No | Yes |

The agreement recognizes the United States' reserved rights to "all water underlying, originating within or flowing through Zion National Park . . . that was unappropriated as of the dates of reservation of the lands now within the boundaries of the park, which waters are to remain in a free-flowing condition," subject to all presently existing uses as well as to a limited amount of future development above the park. The rights comprise "those waters in the Virgin River Basin," and include all tributary sources of surface and groundwater.

Because this agreement provides comprehensive protection of Zion National Park rivers, the National Park Service will support designation under the Wild and Scenic Rivers Act only if the authorizing legislation recognizes the Agreement as constituting the reserved water rights for the park and is explicit in not reserving more water for the park than is provided for in the agreement. Only in this way can the National Park Service honor its commitments made in negotiating the agreement.

Manageability to Protect Outstanding Resource Values (ORVs)

Given the existing situation of nearly complete federal ownership of the river corridors and the administration's focus upon resource protection, ORV protection will continue in the park regardless of designation.

Resource protection on BLM lands will continue under the authority of section 202 of the Federal Lands Policy Management Act until land use planning, through this amendment, is completed. Proposed amended decisions to the *Dixie Resource Area Resource Management Plan* are portrayed in table F-5 below.

Costs Required for Land/Easement Acquisition and Corridor Management

No costs are anticipated for corridor management due to wild and scenic river designation.

Extent to Which Administration Costs will be Shared by Local and State Governments

The river corridors within the park are almost entirely federally owned, and the BLM river corridors are entirely public lands. No additional costs are anticipated due to designation and management of park and BLM segments as wild and scenic rivers. Hence, state and local governments will not be expected to share in the costs of administration.

Feasibility and Timeliness of Designation

The Bureau of Land Management and the USDA Forest Service also currently are conducting wild and scenic river review processes in the Virgin River Basin. A joint review process was not feasible for administrative reasons. However, the three agencies have collaborated on aspects of the wild and scenic process (e.g.: selection of a pool of subject matter experts, and the inclusion of contiguous upstream BLM segments in the NPS assessment process), as directed in the 1996 "Wild and Scenic River Review in the State of Utah — Process and Criteria for Interagency Use," and ensuing interagency agreements. Regardless of the outcome of these other planning processes, designation of the five rivers in Zion National Park and the upstream BLM segments would be both timely and feasible.

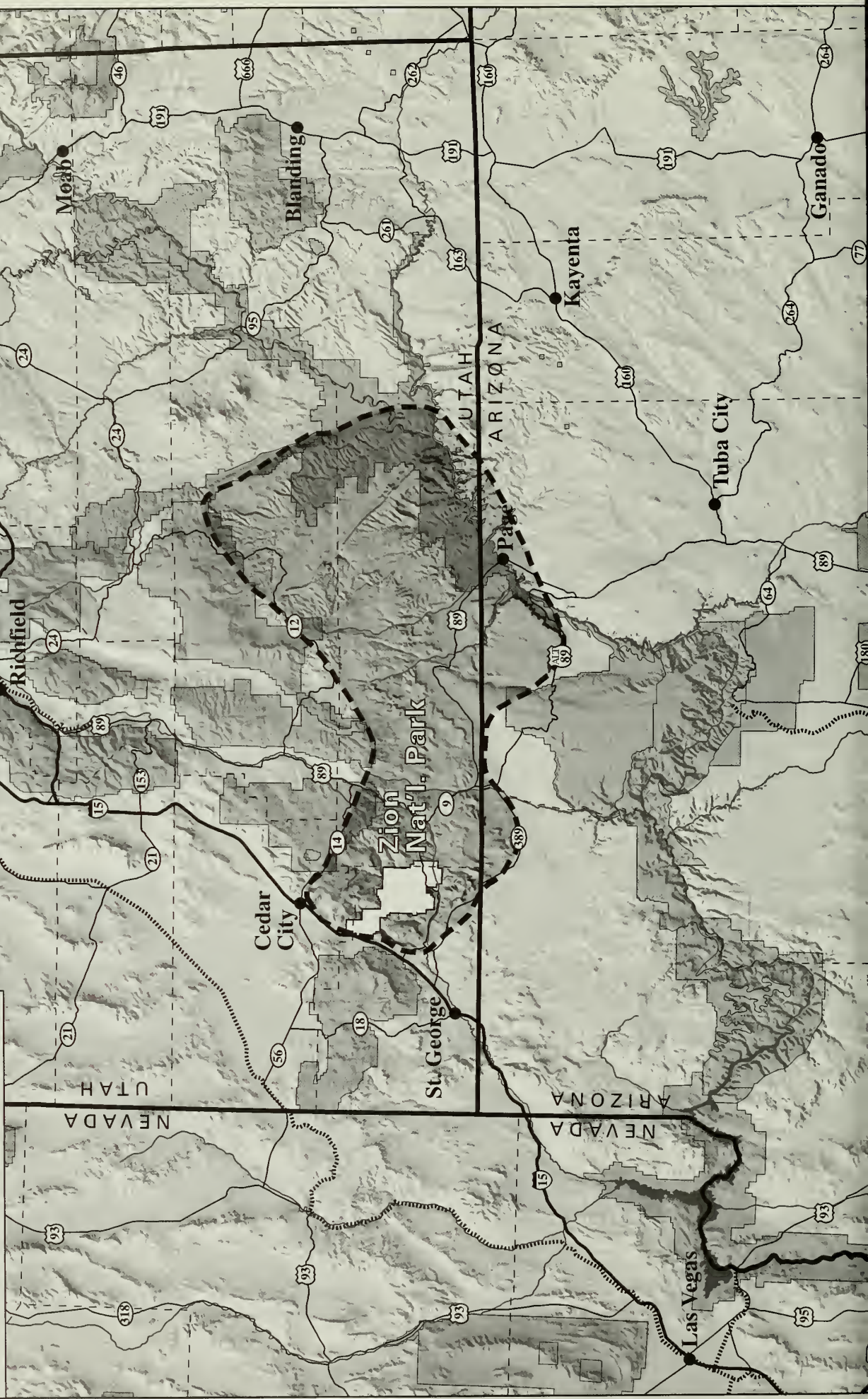
PROPOSED BOUNDARIES

Once rivers are included in the national wild and scenic rivers system, a management boundary is determined. Given the deep, narrow canyon character of many of Zion's rivers, it is proposed that a topographic-based management boundary be considered for these national wild and scenic river designated waterways. Table F-3 depicts corridor width proposals of either 1/2 mile or rim-to-rim.

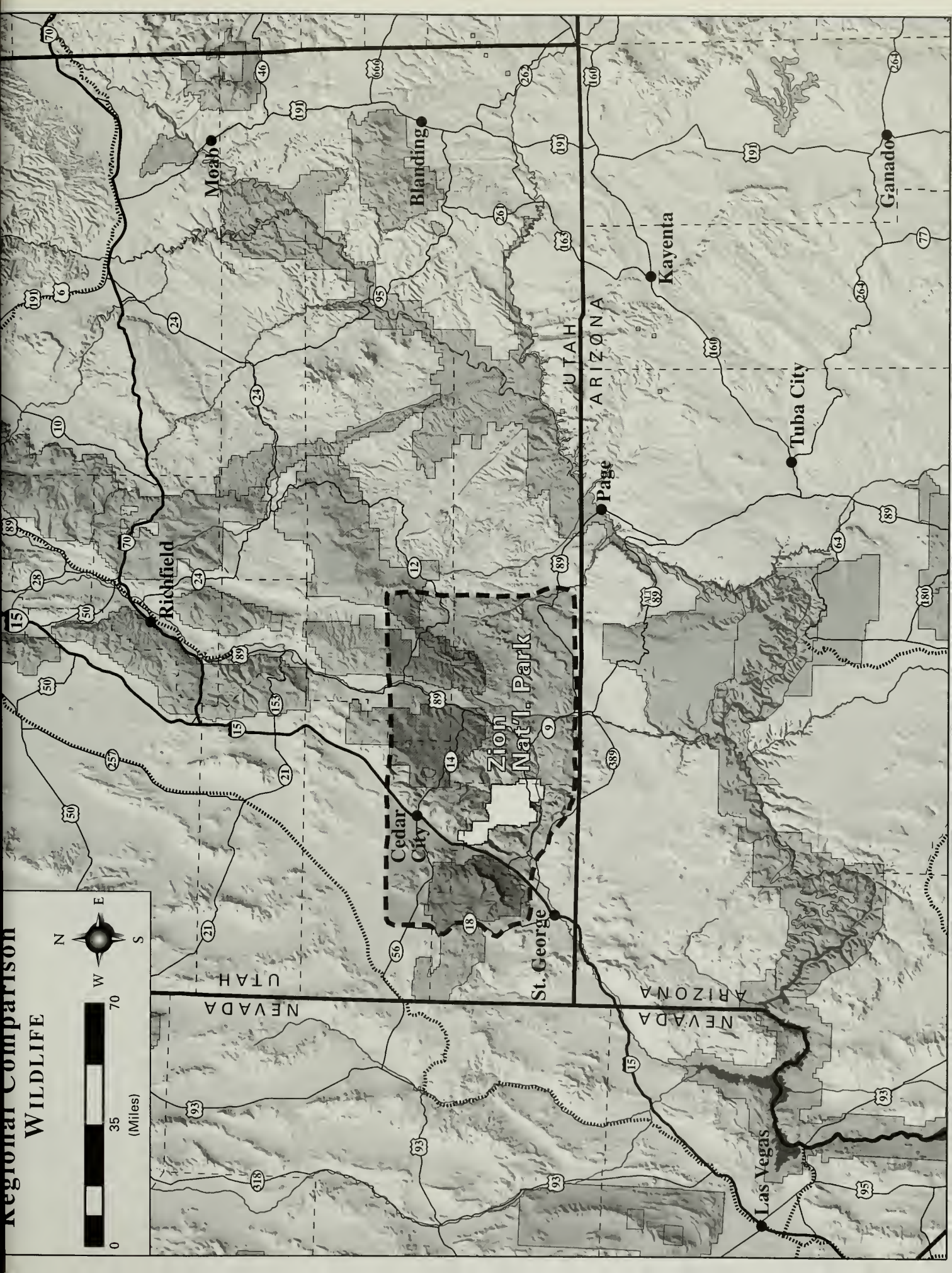
Table F-5: Proposed Management Changes for Suitable BLM River Segments

| | Willis Creek | Kolob Narrows | Goose Creek |
|-----------------------------|-------------------|-------------------|-------------------|
| Off-highway Vehicles | Closed | Closed | Closed |
| Fluid Minerals | Category 3 | Category 3 | Category 3 |
| Locatable Minerals | Plan of Operation | Plan of Operation | Plan of Operation |
| Mineral Materials | Closed | Same as existing | Same as existing |
| Mountain Bikes | Closed | Closed | Closed |

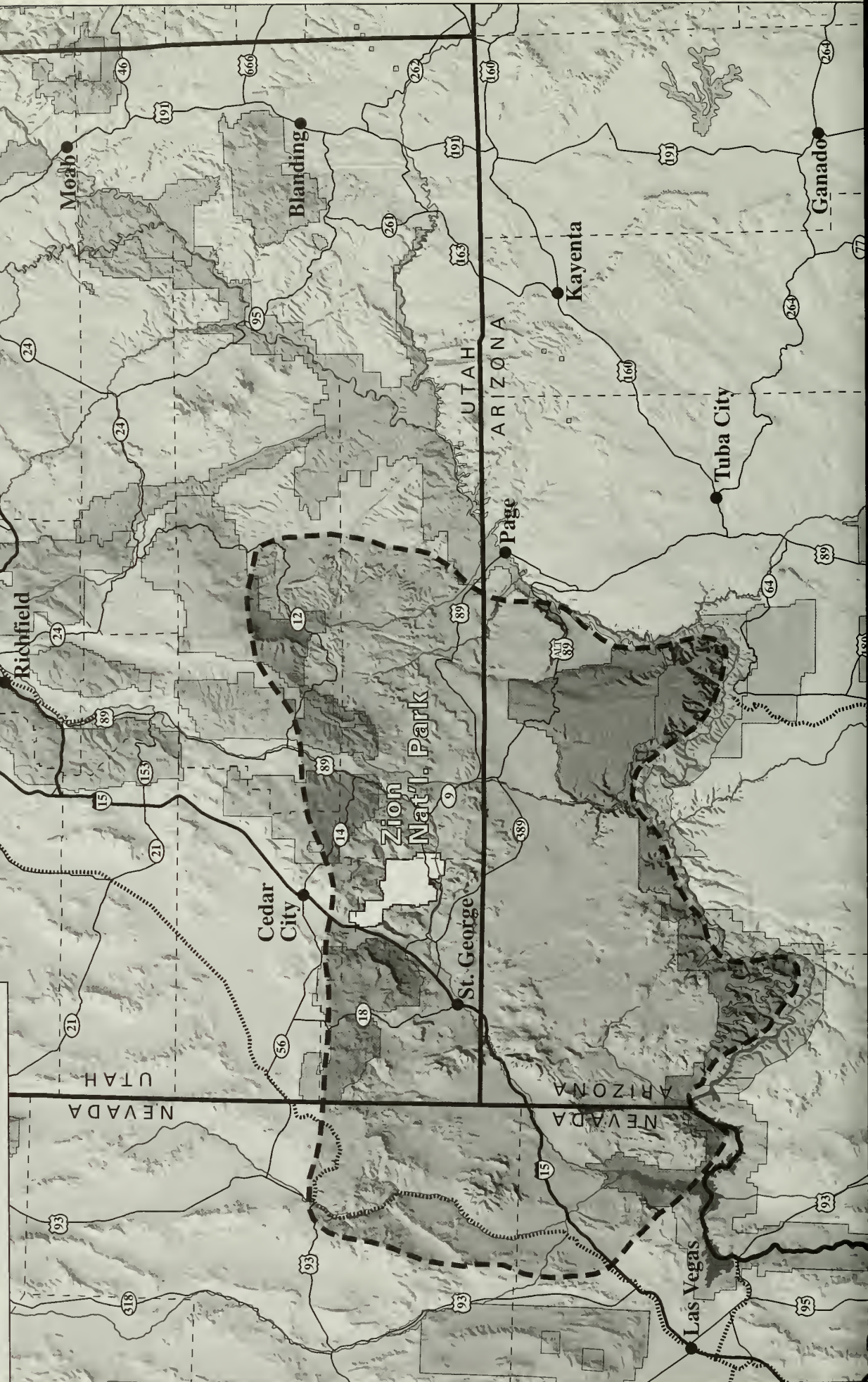
Regional Comparison GEOLOGY



Regional Comparison WILDLIFE

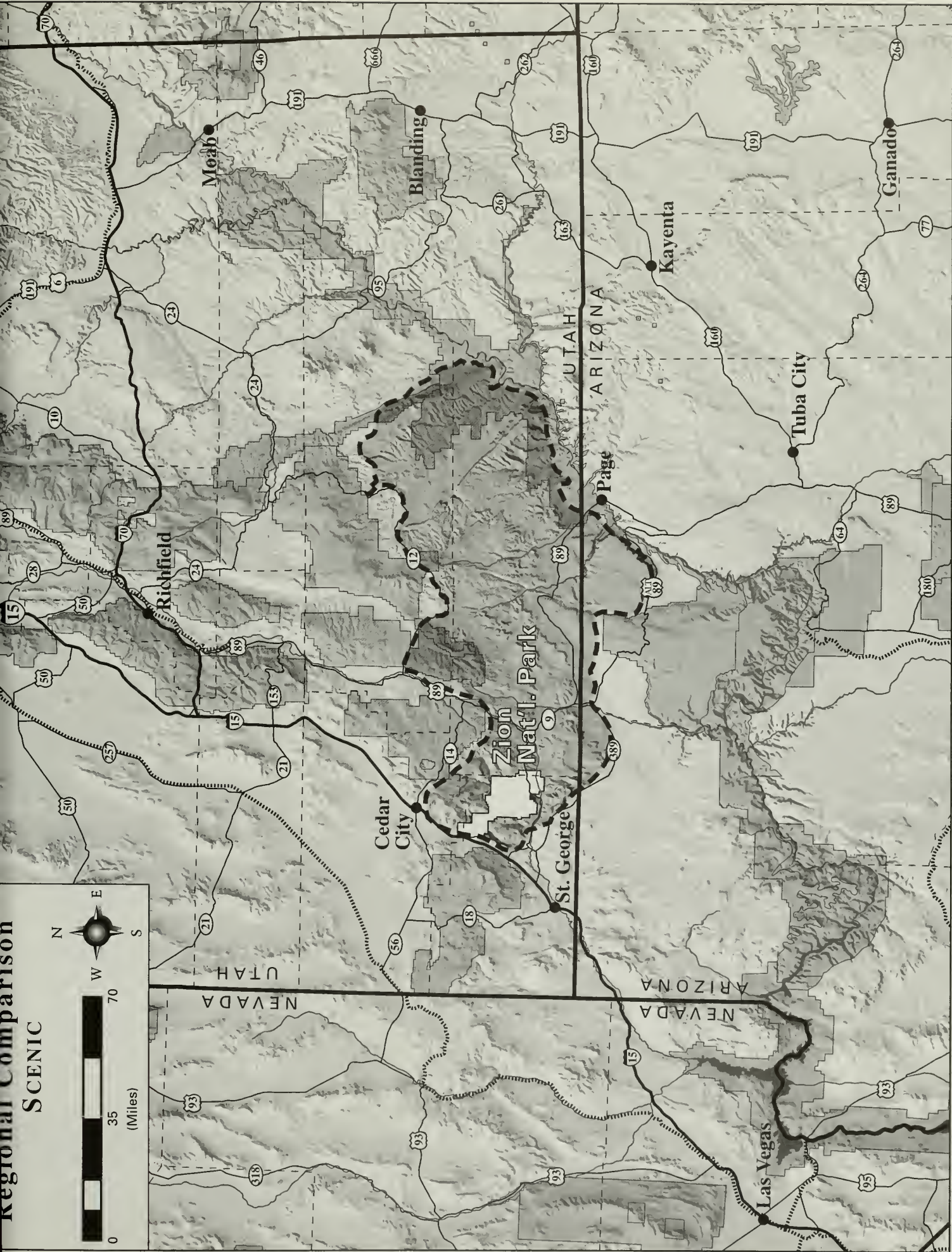


Regional Comparison CULTURAL / HISTORICAL

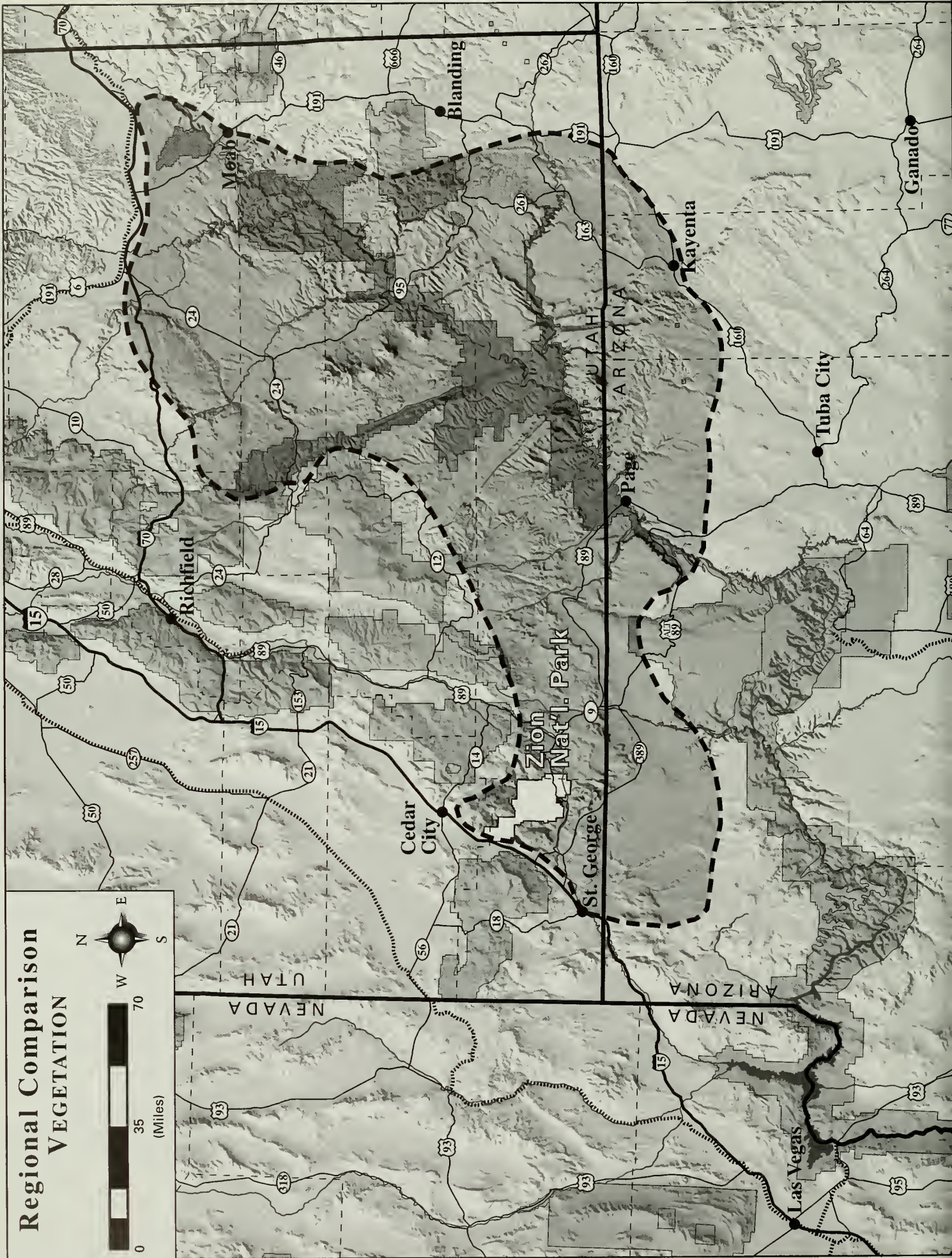


Regional Comparison

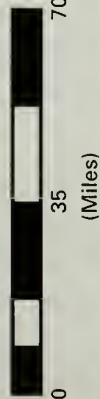
SCENIC



Regional Comparison VEGETATION



FISH



Regional Comparison RECREATION

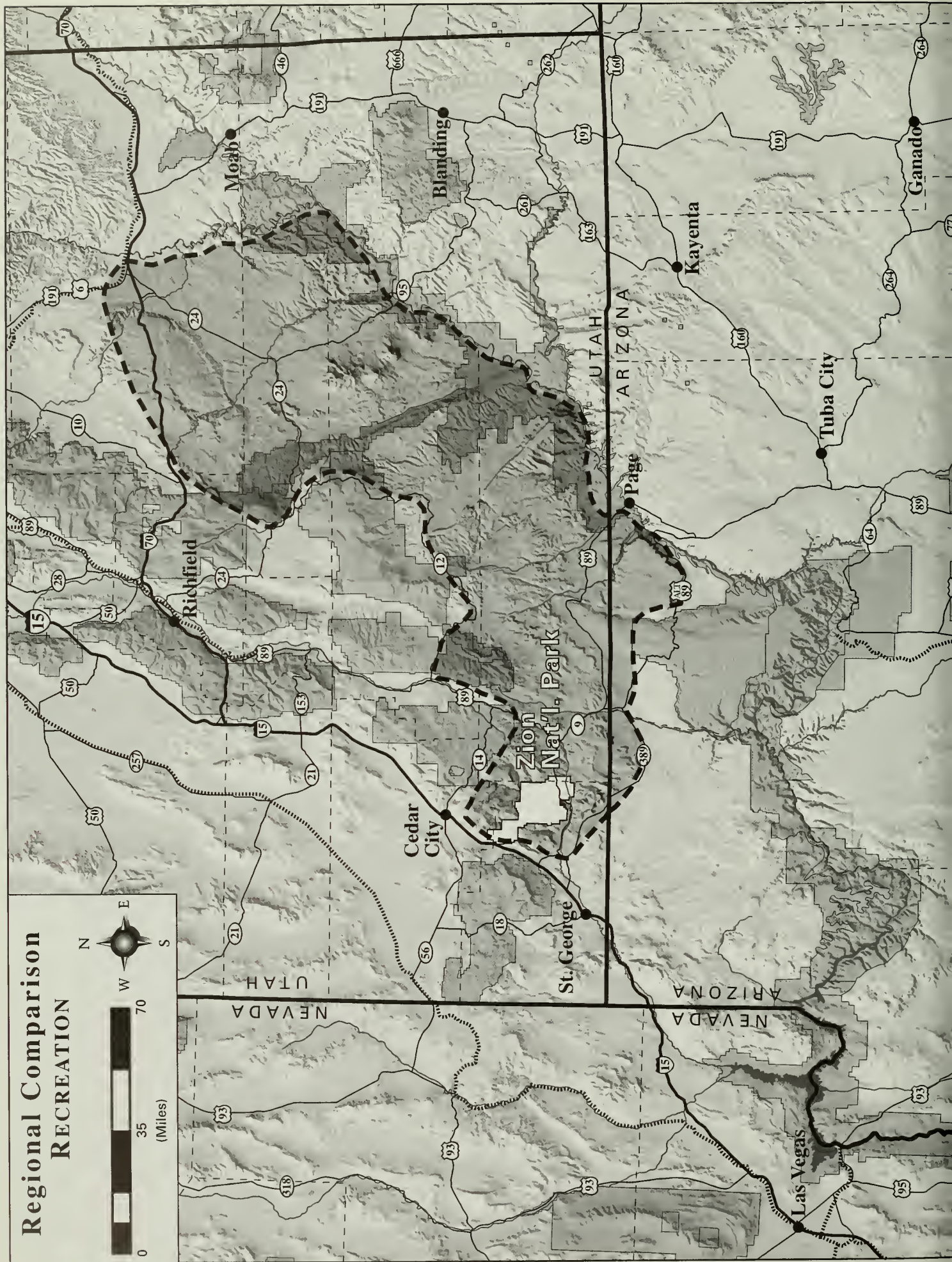


EXHIBIT 2: SUBJECT MATTER EXPERTS

Craig Addley, Professor of Environmental Engineering, Utah State University, Logan

Jack Burns, Cultural Resources Specialist, Zion National Park

J.L. Crawford, Historian

Gardiner Dalley, Archaeologist, BLM Cedar City Field Office

James Deacon, Professor of Environmental Studies, University of Nevada, Las Vegas

Robert Eves, Geologist, Southern Utah University

Steve Hedges, Wildlife Biologist, BLM Cedar City Field Office

Logan Hebner, Professional River Guide

Mary Hunnicutt, Biologist, Zion National Park

Laurie Kurth, Botanist, Zion National Park

Fred Lohrengel, Geologist, Southern Utah University

Bill Lund, Geologist, Utah Geological Society

Ken McDonald, formerly a Nongame Biologist with the Utah Division of Wildlife Resources (now with the Montana Department of Fish, Wildlife & Parks)

Laird Naylor, Archaeologist, Zion National Park

Dave Pettit, Photographer

Dennis Turville, Photographer, Canyoneer

Stan Welsh, Curator and Professor, Brigham Young University

Grant Willis, Geologist, Utah Geological Society

EXHIBIT 3: RESOURCE VALUE RATING CRITERIA

Resource values were rated according to the following criteria. For all of the rating sheets, the following ratings were used

3 = value is one of the most significant in the region

2 = value is typical in the region

1 = value is less significant than most in the region

0 = value is nonexistent

Cultural/Historical Criteria:

Significance: Consider sites or features associated with use by prehistoric, historic, contemporary cultural groups, or a historically significant event or person. Consider sites that have significant human interest value. Rare, unique, or unusual sites or features are of higher value.

Site Integrity: Consider presence of exceptional examples of architecture, features, or remains from a significant period in history. Unmodified sites retaining original character and features in excellent condition and providing exceptional examples are of higher value.

Ethnographic Significance: Consider sites, features, or resources associated with historic or modern day use, that exhibit a continuation of traditional use (e.g., fishing, natural resource collection), or are related to land use (i.e., irrigation).

Data Potential: Consider major sites or features with multiple scientific data sources. River corridors representing more than one culture or culture periods are of higher value. Sites and features used for rare and sacred purposes are of higher value.

Education/Interpretation: Consider sites that have regional or national importance for interpreting significant prehistoric or historic events, sites, or people; sites that clearly and graphically reveal an interesting or unique history of the region; and have the ability to attract visitors from outside the region.

Listing/Eligibility: Consider corridors that contain sites or features that are currently listed in, or are eligible for, the National Register of Historic Places, or designated as a national historic landmark.

Geology Criteria:

Geologic and Hydrologic Feature Abundance: Landforms with unusual, unique, or outstanding geologic/hydrologic features (e.g., deep canyons, unique rock formations/outcrops, waterfalls, wetlands, hanging gardens, gorges, arches, lake deposits, stream terraces, hoodoos, lava flows). River corridors with an abundance of unusual, unique, and distinctive geologic features to the region are of higher value.

Diversity of Features: Consider the number and variety of special geologic/hydrologic features, and the value of these features to the region. Consider the unique or rare combination of geologic/hydrologic features (e.g., erosional, volcanic). The greatest diversity of features are of higher value.

Educational/Scientific Value: Geologic/ hydrologic features clearly and graphically reveal an interesting/unique educational or scientific story of earth's history. River corridors that represent "textbook" examples of a common feature or are the best example of a feature in the region are of higher value.

Wildlife Criteria:

Habitat Quality: Consider the presence, extent, and carrying capacity of a variety of wildlife habitats, including winter range, summer range, transition zones, travel corridors, and calving areas. Consider unique habitats or critical links in habitat for rare species (federally listed, state-listed, sensitive species, or candidate species). Areas with the greatest and best habitat, contiguous habitat, and habitat for rare species are of higher value.

Species Diversity: Consider the number and variety of species present and the value of these species. Rivers with the greatest diversity of species, including rare species, are of higher value.

Species Abundance: Rivers with the greatest number of wildlife within the river corridor are of higher value.

Natural Reproduction: Rivers with extensive natural reproduction are of higher value than those supported mostly by transplants.

Quality of Experience (wildlife viewing): Consider the sights, sounds, and smells attendant with wildlife experience. Highly scenic, pristine rivers are of higher value as compared to rivers that are visually monotonous, heavily developed, malodorous, or noisy.

Fish Criteria:

Habitat Quality: Consider the presence, extent, and carrying capacity of spawning areas, rearing areas and adult habitat; and habitat for wild stocks and rare species (federally listed, state-listed, sensitive species, or candidate species). Areas with the greatest amount and best habitat, especially for wild stock and rare species, are of higher value.

Species Diversity: Consider the number and variety of species present and the value of these species. Rivers with the greatest diversity of species, including wild stocks and rare species, are of higher value.

Species Abundance: Rivers with more fish are of higher value.

Natural Reproduction: Rivers with extensive self-sustaining natural reproduction are of higher value than those supported mostly by stocking.

Ecology/Vegetation Criteria:

Species Diversity: Consider the presence, extent, and diversity of plant communities; ecological values that are critical to protection of biological diversity; and critical habitat for species conservation (e.g., refugia). River corridors with the greatest diversity and importance to species conservation are of higher value.

Riparian Habitat Quality: Consider riparian communities that are intact with structural diversity and species composition appropriate for the

geographic area. Vegetative composition and distribution is primarily of native species.

Ecological Function: Consider rivers with rare or unique corridors that are critical and essential for species migration and genetic interaction. Natural flooding, channelization, and river movement are not impeded or altered (i.e., there are no human-made structures along the banks or in the river).

Rare Communities: Rivers with rare, sensitive, threatened and endangered species, communities, and habitats are of higher value.

Educational/Scientific: Consider ecological values and features that clearly and graphically reveal an interesting/unique educational or scientific story of the ecological form and function. River corridors that represent “textbook” examples of plant and animal associations or ecological values/features in the region are of higher value.

Recreation Criteria:

Length of Season: Consider the amount of time the river corridor is used or available for recreation purposes, such as outdoor education, photography, backpacking, hiking, canyoneering, climbing, camping, horseback riding, kayaking, etc. Rivers with the longest season of use are of higher value.

Recreation Diversity: Consider the number and variety of recreation uses occurring within the corridor. Rivers that provide for the largest number and diversity of recreation uses are of higher value.

Experience Quality: Consider the comparative number or percent of similar experiences available in the region. Rivers that provide the most unique opportunities are of higher value.

Social Setting: Consider the type of use, level of use, and potential conflicts between user groups in and along the river corridor. Rivers with uncrowded conditions and no user conflicts are of higher value.

Scenery Criteria:

Diversity of View: Consider the presence of high relief; severe surface variation; rich color combinations (e.g., high variety, vivid colors); pleasing contrast in soil, rock, vegetation, and water; views that greatly enhance visual quality; still or cascading water that is dominant in the landscape. River corridors with the greatest diversity and variety of views, both foreground and background, are of higher value.

Special Features: Consider outstanding natural, historical, or cultural features; landforms with unusual or outstanding topographic features (e.g., gorges, narrow slot canyons, high relief, rock outcrops, falls, rapids, springs, color, vegetation). River corridors with high relief and focal points that are visually striking, particularly memorable, or rare in the region are of higher value.

APPENDIX G: LETTER FROM THE U.S. FISH AND WILDLIFE SERVICE

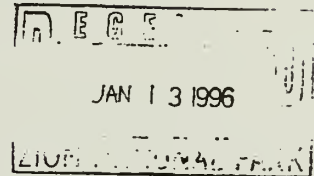


In Reply Refer To
(CO/KS/NE/UT)

United States Department of the Interior FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE
LINCOLN PLAZA
145 EAST 1300 SOUTH, SUITE 404
SALT LAKE CITY, UTAH 84115

January 8, 1997



Memorandum

To: Superintendent, Zion National Park, Springdale, Utah

From: Assistant Field Supervisor, U.S. Fish and Wildlife Service, Utah
Ecological Services Field Office, Salt Lake City, Utah

Subject: Endangered and Threatened Species List for Zion National Park Visitor
Management Resource Protection Plan and Environmental Impact
Statement

The U.S. Fish and Wildlife Service (Service) has received your request for a list of endangered and threatened species which may occur in the area of influence of the subject management plan for Zion National Park. The following species may occur in the project area:

| <u>Common Name</u> | <u>Scientific Name</u> | <u>Status</u> |
|--------------------------------|-----------------------------------|---------------|
| Bald Eagle | <i>Haliaeetus leucocephalus</i> | Threatened |
| Desert Tortoise | <i>Gopherus agassizii</i> | Threatened |
| Mexican Spotted Owl | <i>Strix occidentalis lucida</i> | Threatened |
| Peregrine Falcon | <i>Falco peregrinus</i> | Endangered |
| Southwestern Willow Flycatcher | <i>Empidonax traillii extimus</i> | Endangered |
| Utah Prairie Dog | <i>Cynomys parvidens</i> | Threatened |

Though we do not believe there are currently any Utah Prairie Dogs within park boundaries, the southern tip of the species' range is so close to Zion's northern border that they were included because Zion may be within their dispersal range.

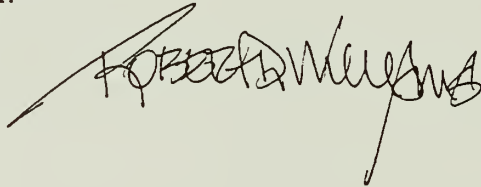
Only a Federal agency can enter into formal Endangered Species Act (ESA) section 7 consultation with the Service. A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Service of such a designation. The ultimate responsibility for compliance with section 7, however, remains with the Federal agency.

The proposed action should be reviewed and a determination made if the action may affect any listed species or its critical habitat. A determination also should be made if the action is

likely to jeopardize a proposed species or result in the destruction or adverse modification of any proposed critical habitat. If the determination is "may affect" for listed species, formal ESA section 7 consultation should be requested by the Federal agency to the Assistant Field Supervisor at the address given above. In addition, if a determination is made that the proposed action may jeopardize proposed species or result in the destruction or adverse modification of proposed critical habitat, the Federal agency must confer with this office. At that time, the Federal agency should provide this office with a copy of a biological assessment or any other relevant information that was used in reaching its conclusion.

Your attention is also directed to section 7(d) of the ESA, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which would, in effect, deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

If further assistance is needed, please contact me or Marilet A. Zablan, Wildlife Biologist, of this office at telephone (801) 524-5001.

A handwritten signature in black ink, appearing to read "Robert D. Williams". The signature is written in a cursive, somewhat stylized font. There is a long, sweeping horizontal line that starts under the "R" and extends across the signature, ending under the "s".

APPENDIX H: DRAFT STATEMENT OF FINDINGS FOR THE GENERAL MANAGEMENT PLAN / ENVIRONMENTAL IMPACT STATEMENT, ZION NATIONAL PARK

INTRODUCTION

Description of the Site

The North Fork of the Virgin River is the main drainage through Zion Canyon. A number of tributary streams feed into the North Fork within the canyon, including Birch Creek. Zion Canyon is the primary visitor use area within the park. Because of the physiographic characteristics of the canyon, a narrow valley confined by tall canyon walls, much of the existing use and development is located along the bottom of the main canyon or side streams.

Description of the Proposed Action

This statement of findings addresses the National Park Service proposal to retain the Zion Lodge and associated development, the support facilities at Birch Creek, existing picnic areas, as well as the addition of new picnic sites in Zion Canyon. Maintenance of other existing facilities within the canyon and proposed transportation system developments were covered under the statement of findings for the Development Concept Plan for Zion Headquarters (NPS 1994a) and the subsequent Zion Canyon Transportation System Environmental Assessment (NPS 1997a). The transportation system plan modified the elements of the earlier development concept plan and the statement of findings.

Flooding Characteristics in the Area

The North Fork experiences wide fluctuations in flow with a seasonal snowmelt peak in the spring, followed by generally low summer and fall flows. Occasional heavy storms, which can occur at any time of the year but are most common in summer and early fall, produce the largest flows in the Virgin River system. These runoff events are usually of short duration and

can occur suddenly. Floods in desert regions such as Zion are often accompanied by large quantities of debris and sediment, increasing the impact of floods. One reservoir is two and one-half miles upstream of the park on a tributary of the Virgin River. The Kolob Reservoir releases into Kolob Creek, which runs southeast into the North Fork.

Through much of Zion Canyon, the 100- and 500-year floodplains closely follow the banks of the river. The probable maximum flood area flows out into much of the valley floor.

Estimates of flood stage indicate that the Zion Lodge and associated facilities (parking, rest rooms, cabins, concessioner housing) would be protected by the existing road grade, which would contain both the 100- and 500-year floods. An exception to this is in the upstream reach adjacent to the main lodge building, where the 500-year flood would overtop the road and inundate a portion of the lawn area in front of the lodge. The flood depth would not reach the lodge foundation and overbank velocities would not likely exceed two feet per second. Even with failure of the road grade, neither of these design floods would reach the elevation of the lodge, since the foundation is estimated to be a minimum of three feet above the 100-year flood and one foot above the 500-year flood.

No floodplain mapping or flood stage estimates have been made for the support facilities (concessioner housing, water tank, and stable/corrals) on the Birch Creek point. Based on the topography and river channel characteristics in this area, these facilities are likely elevated outside of the 100- and 500-year floodplains, but would be within the probable maximum floodplain.

JUSTIFICATION FOR USE OF THE FLOODPLAIN

Why the Proposal Would Retain Facilities in the Floodplain

The Zion lodge and Birch Creek facilities would be retained for their existing use and would remain within the probable maximum floodplain. The floodplain is closely bordered by canyon walls that slope upward at a sharp angle. Therefore there is little canyon bottom that is level enough for development that is outside of the floodplain and there are no other suitable non-floodplain sites on the narrow canyon bottom for relocation of these facilities. The overnight facilities in these two areas would be outside of the more frequently flooded sites as well as the 100- and 500-year floodplains. The park's warning and evacuation procedures would also remain in effect.

Under NPS procedures for implementing Executive Order 11988, the existing and proposed picnic areas may be placed within the 100-year floodplain, but these day use facilities must contain signs informing visitors of flood risk and suggested actions in the event of flooding. These facilities would be signed to warn visitors of flash flood hazards and evacuation areas.

Alternatives Considered in the Environmental Impact Statement

There were no alternatives considered in the general management plan that would remove the Zion Lodge, Birch Creek development, or picnic areas. One alternative did consider converting the lodge to an environmental education center, although overnight use would still continue in support of this new function.

DESCRIPTION OF SITE-SPECIFIC FLOOD RISK AND ACTIONS TO MINIMIZE HARM TO FLOODPLAIN VALUES AND TO MINIMIZE RISK TO LIFE OR PROPERTY

The above facilities for visitors and employees, including overnight users, would be maintained in

their existing locations within flood hazard areas along the North Fork and tributaries because flood prone areas are unavoidable within the confines of the canyon walls. These facilities could be lost during an extreme flood event, but are outside of areas potentially subject to more frequent flooding. To protect lives the evacuation plan and warning system would remain in effect. The flash flood warning and evacuation plan consists of daily contact between Zion dispatch and the National Weather Service during the summer to receive weather forecasts and storm potential conditions. Observations of drainage conditions by park rangers are also collected. The standard operating procedure is to close the upper canyon road to visitor traffic during flash floods, while posting rangers as scouts along the river to warn visitors and employees of impending danger. The park would also emphasize public education and awareness of flood hazards. Picnic facilities would be signed to warn of flash flood hazards and evacuation areas. These measures would minimize potentially hazardous conditions to people.

The natural and beneficial values of floodplains (moderation of floodwaters, maintenance of water quality, and groundwater recharge) would primarily not be affected by retaining the existing facilities. Minimal effects on ground water recharge would result from retention of impervious structures or paved surfaces.

SUMMARY

The National Park Service has determined that there is no practicable alternative to maintaining Zion Canyon Lodge, Birch Creek support facilities, and picnic areas within the probable maximum floodplain. This determination was based on the decision to maintain Zion Canyon as the primary visitor use area within the park, with provisions for overnight and day-use facilities. These facilities are not within areas subject to frequent flooding, and with the early warning system and evacuation plan in use, the risk to human safety would be minimized.

Recommended:

Water Resources Division Date

Recommended:

Regional Safety Officer Date

Recommended:

Regional Compliance Officer Date

Recommended:

Regional Director Date

BIBLIOGRAPHY

- American Automobile Association
1998 *TourBook for Utah and Colorado*.
AAA Publishing, Heathrow, FL.
- Bureau of Economic Analysis, Regional Economic
Measurement Division, Economics and Statistics
Administration, U.S. Department of Commerce
1997 *Regional Economic Information
System* (CD ROM, 1969-1995 data).
Washington, D.C.
- Bureau of Land Management (BLM), U.S.
Department of the Interior
1998 Dixie Resource Area. Proposed
Resource Management Plan and Final
Environmental Impact Statement. St.
George, UT.
- Bureau of the Census, U.S. Department of
Commerce
1996 "General Profile, USA Counties."
Available on Internet @
<<http://www.census.gov/statab/USA96/49/053.txt>>.
- Connor, M. A. and S. M. Vetter
1986 "Archeological Investigations in Zion
National Park." Midwest Archeo-
logical Center Occasional Studies in
Anthropology No. 19. National Park
Service, Lincoln, NE.
- Crawford, J. L.
1986 *Zion Album*. Zion Natural History
Assoc., Springdale, UT.
- 1988 *Zion National Park Towers of Stone*.
Zion Natural History Assoc.,
Springdale, UT.
- Euler, R.C.
1966 *Southern Paiute Ethnohistory*.
University of Utah Anthropological
Papers, No. 78. University of Utah
Press, Salt Lake City, UT.
- Grand Circle Association
1993 "The Grand Circle Adventure."
Printed newspaper. Page, AZ.
- Gregory, S. C. and J.E. Deacon
1994 "Human Induced Changes to Native
Fishes in the Virgin River Drainage.
Effects of Human-Induced Changes
on Hydrologic Systems." Proc.
AWRA 1994:435-444.
- Hamilton, W.F.
1992 *The Sculpturing of Zion*. Zion Natural
History Association, Springdale, UT.
- Littlejohn, M.
1993 "Visitor Services Project, Zion
National Park." Report 50. Prepared
for the National Park Service.
Cooperative Park Studies Unit,
University of Idaho, Moscow, ID.
- National Park Service (NPS), U.S. Department of
the Interior
1974 *Final Environmental Impact Statement
/ Wilderness Recommendation, Zion
National Park, Utah*. On file at park
headquarters.
- 1997 "Secretary of the Interior's Standards
and Guidelines for Archeology and
Historic Preservation." Appendix C in
Director's Order 28: *Cultural
Resource Management Guideline*,
Washington, D.C.
- 1976 *Final Environmental Impact State-
ment. Proposed Zion Master Plan*.
Zion National Park, Utah. On file at
park headquarters.
- 1977 Zion National Park Master Plan. On
file at park headquarters.
- 1984 "Land Protection Plan, Zion National
Park." On file at park headquarters.
- 1988 *NPS Management Policies*.
Washington, D.C.
- 1993 *Guiding Principles of Sustainable
Design*. Denver Service Center,
Denver, CO.

- National Park Service (cont.)
- 1994a "Resource Management Plan. Zion National Park." On file at park headquarters.
 - 1994b *Development Concept Plan. Zion Canyon Park Headquarters.* Zion National Park, Utah. On file at park headquarters.
 - 1995a *Standards and Guidelines for Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings.* Washington, D.C.
 - 1995b *Report on Effects of Aircraft Overflights on the National Park System.* Washington, D.C.
 - 1996 "Zion National Park Interpretive Plan." Unpublished. On file at park headquarters.
 - 1997a *Zion Canyon Transportation System Environmental Assessment.* On file at park headquarters
 - 1997b "Zion National Park Backcountry Trip Planner."
 - 1997c *National Park Service Strategic Plan. 1997.* Washington, D.C.
 - 1998a "Zion National Park Visitor Map and Guide." Printed newspaper. On file at park headquarters.
 - 1998b "Zion Housing Management Plan." Unpublished. On file at park headquarters.
 - 1998c "Planners Sourcebook, Director's Order 2: Park Planning." Denver Service Center, Denver, CO.
 - n.d. "Zion National Park Compendium." Unpublished. On file at park headquarters.
- Sappington, J. M.
- 1998 "Recreational Disturbance of a Desert Stream Fish Community: Detecting Ecological Effects of Environmental Impact." Draft Master Thesis. University of Nevada, Las Vegas.
- Schroeder, A. H.
- 1955 *Archeology of Zion National Park.* University of Utah Anthropological Papers, No. 22. Salt Lake City, UT.
- Shacklett, A.
- 1995 "Visitor Utilization Study, Zion National Park." Prepared for the National Park Service. Operations Research Consulting Associates, Orlando, Florida.
- Shakarjian, M.J. and J. A. Stanford
- 1998 "Effects of Trampling by Hikers on Zoobenthos of the North Fork of the Virgin River, Zion National Park, Utah." Flathead Lake Biological Station Open File Report No. 145-97. Prepared for Zion National Park, Springdale, Utah. On file at park headquarters.
- St. George Area Chamber of Commerce
- 1996 "Business Directory, Visitors and Relocation Guide." Published by the *St. George Magazine*, St. George, UT.
- Stoffle, R., et al.
- 1995 "Ethnographic Overview and Assessment: Zion National Park, Utah and Pipe Spring National Monument, Arizona." Report on file, Zion National Park.
- Swarthout, E. C. H. and R. J. Steidl
- 1999 "1998 Annual Report: Recreation and Mexican Spotted Owls on the Colorado Plateau." Prepared for the National Park Service. Univ. of Arizona. Tucson, AZ.
- U.S. Department of the Interior and Department of Agriculture
- 1982 "National Wild and Scenic Rivers System; Final Revised Guidelines for Eligibility, Classification, and Management of River Areas." *Federal Register*, Part VII, September 7, 1982.
- U.S. Fish and Wildlife Service, U.S. Department of the Interior
- 1995 Recovery Plan for the Mexican Spotted Owl: Vol. 1. Albuquerque, New Mexico.

U.S. Forest Service, U.S. Department of Agriculture

- 1992 "Riparian Ecology in Zion National Park," by K. Harper, S. Sanderson, and D. McArthur. In: *Proceedings. Symposium on Ecology and Management of Riparian Shrub Communities in Sun Valley, ID*. General Technical Report INT-289. Inter-mountain Research Station, Missoula, MT.

U.S. Forest Service, Bureau of Land Management, and National Park Service

- 1996 "Wild and Scenic River Review in the State of Utah. Process and Criteria for Interagency Use." On file, Zion National Park.

Valdez, R. A., W. J. Masslich, R. Radant, and D. Knight

- 1991 "Status of the Virgin River Spinedace (*Lepidomeda mollispinis mollispinis*) in the Virgin River Drainage, Utah." Project Report prepared for the Utah Division of Wildlife Resources, Salt Lake City, Utah., BIO/WEST, Inc. Report No. PR-197-1.

Vande Kamp, M.

- 1997 "Existing Social Data Relevant to the VERP Process at Zion National Park." Technical Report NPS/CCSOZION/NRTR-97-05. NPS D-116. Prepared for the National Park Service. College of Forest Resources, University of Washington, Seattle, WA. On file at the Technical Information Center, Denver Service Center, Denver, CO.

Wauer, R.H.

- 1965 *Reptiles and Amphibians of Zion National Park*. Zion Natural History Assoc., Springdale, UT.

Wauer, R.H. and D.L. Carter

- 1965 *Birds of Zion National Park*. Zion Natural History Assoc., Springdale, UT.

Welsh, S. L.

- 1990 *Flowers of Zion National Park*. Zion Natural History Assoc., Springdale, UT.

Williams, C.D. and J.E. Deacon

- 1998 Recommendations for a Comprehensive Virgin River Watershed and Native Fishes Conservation Program. Briefing Book. Pacific Rivers Council. Cited by J.M. Sappington, "Recreational Disturbance of a Desert Stream Fish Community: Detecting Ecological Effects of Environmental Impact." 1998 draft master's thesis.

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